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Systematic Preparation of Mineralized Ores by Dry Crushing and Concentration.

V.

COST OF CRUSHING BY ROLLS.

The nature of this operation admits of no exact data by which a close calculation can be set down for any special case.

Writers on the subject must confine themselves to the practical operations which come under their observation, hence the cost varies with the conditions in such instances. The conditions are various, and among them must be considered the first cost and the hardness of the rolls, the wear and tear of the machinery generally, the cost of power in different localities, also the varying cost of labor, the texture of the stuff to be crushed and the not less important arrangement of the establishment. For the purpose, however, of getting at the items which enter into all calculations of this kind, the following details are given by which the cost, in any special case, may be approximated very closely.

Material.—Steel grained lead ore associated with carbonate of iron, quartz and hard grauwacke.

Size of rolls—21 in. diam., 19 in. on face.

Weight—2700 lbs. new—1600 lbs. when worn out by crushing 2000 tons.

Speed—8 revolutions per minute, speed of face 42 feet per minute.

Size of Stuff—20 to 60 millimeters—when crushed 6 to 10.

Quantity.—2½ tons per hour.

Duration of rolls—2000 tons by one set of rolls.

COST OF CRUSHING PER TON.

Redemption of rolls, less worth of old rolls, per ton	2½ cts.
Cost of labor, per ton	4½ cts.
Cost of steam power (5 horse.)	10 cts.
Wear and tear of machinery, oil, etc	2 cts
Total cost per ton	19 cts.

DETAILS OF SEVERAL ESTABLISHMENTS.—METALLIFEROUS ORES AND MINERALS.

NUMBER ONE.

Diam.	Face	Rev. per m.	Speed of face.	Quantity per h.	Horse-power.
36 in.	10 in.	10—20	90—180	5 tons	5—8
27	10	12—20	80—140	4 "	4—5
21	10	15—20	80—100	3 "	3—4
15	10	25—30	80—100	2 "	2¼—3¼
12	10	30	90	1½ tons	2—3
10	10	40	100	1 "	1—2¼

NUMBER TWO.

Diam.	Face.	R. per m.	Crushing area per m. s. in.	Sieve holes per in.	tons per h.	horse-power.	cost.
14 in.	14 in.	5½	5,593	9	2	6	05
23	12	10	8,670	36	2	13	23
25	12	12½	12,075	36	1 7-10	15	05
24	15	10	12,300	100	5	15	04½
27	15	10	12,720	100	5	16	07½

In the case first given in detail, one horse-power produced in twenty-four hours twelve tons of crushed stuff.

In table No. 1 the average extreme of horse-power stated, equals a product of 14 tons per horse-power per twenty-four hours, under the conditions set down.

Taking the last two cases in table No. 2. each horse power employed for twenty-four hours produced the average of 8 tons per horse, stuff passing through sieves with 10 meshes to the linear inch or 100 meshes per square inch.

Estimating for crushing stuff to pass a sieve 100 holes to the square inch, on the basis of one horse-power for five tons in twenty-four hours, will therefore be deemed entirely safe; for redemption of rolls three times the cost above stated; wear and tear of machinery at twice the cost; labor of four men at $2 50 per twelve hours.

Cost of power (25 horse) 125 tons per twenty four hours	$12 50
Cost of redemption of rolls, per twenty-four hours	10 00
Cost of wear of machinery, oil, etc.	5 00
Cost of labor	10 00
Cost of 125 tons in twenty-four hours	$37 50
Cost per ton	30
Previous cost of breaking and drying, estimated	50
Total cost of preparing the ore for concentration, per ton	80

ELEVATORS AND SIEVES.

Concerning the kind of elevators to be employed, but little need be said. Nearly, if not all, the locations adapted for such establishments, will require the use of elevators carried somewhat above the main building in order to gain height, as well for the distribution of the sized lots to proper bins, as for the placing of the screens one above the other. The common cups or buckets travelling on an endless belt or iron rope accomplish this operation cheaply, and if arranged properly requiring no attendance. The wear of this contrivance can be greatly overcome by providing proper shutes to fill the buckets in passing, rather than to compel them to fill by dipping or passing through the mass of crushed ore. This plan is adopted by Mr. KROM in works now in course of erection.

Almost in every case it will be found of great advantage to grade the stuff into at least three, perhaps four sizes, for the purpose of closer concentration, if not also, in some cases of gold ores, for the purpose of impoverishing one or more grades sufficiently, to allow of no further treatment. Experiment has shown the practicability of denuding the whole mass of what is termed tailings so closely, that no subsequent treatment would pay the cost of handling. It would be promising too much to assert that this can be done in all cases with all descriptions of ores containing gold, but there is ample warrant, as will be seen in the next article, for the belief that in most cases this denuding or impoverishment can be carried sufficiently far to permit the bulky matter to go without further effort at saving.

The chief advantage to be gained in the construction of the screens is that of systematic arrangement and adaptation for the work required, looking as well to the future disposition of the stuff as to the fitness of the contrivance in connection with the whole system. Four purposes have been sought, in this respect, by Mr. KROM—

I. The coarsest screen is placed at top in order to take the heft of the work, as it is the most capable of doing.

II. The different grades of screens are placed one nearly under the other, with simple shutes to guide the stuff in its passage from one to the other—that which has gone through being directed to its proper bin.

III. The screens are designed in the shape of a cone, in order to allow the shafts to be horizontal and parallel. By this means the ore gains a larger distributing area as it becomes poorer in the size which will pass the particular screen and traverses the length of the screen by its own gravity. The gear of the screens is also simplified, so that one can take power from the other, or all be driven from one main shaft by belts.

IV. The discharge of particles which incline to stick in the meshes is facilitated by the use of automatic hammers placed above, and striking on the periphery of the frame work as more efficient in effecting a dislodgment of the fastened particles—a blow beneath having the contrary effect. Ore of the right size follows the same laws, being discharged more freely by concussion downward than upward.

When the screening apparatus is erected upon this simple plan, unison in design and fitness of the parts work together harmoniously at the minimum of wear and repair, requiring no more than ordinary vigilance for perfect and continuous working. The power required for elevating and doing the work of screening is but a small item per ton when operating largely. The wear and tear of the apparatus is more important, especially in respect to the material comprising the screens. A charge of five cents per ton is deemed a large estimate for both, no charge being made for special labor; that which is employed about the concentration being sufficient to overlook this preparatory step. The stuff being now disposed in bins provided for each grade or size, the succeeding and final operation, concentration by Krom's dry-ore separator, will be considered in the next article.

G. W. BAKER.

The Polytechnic Association of the American Institute.

Meeting held Feb. 9, 1872. President TILLMAN in the chair.

THE meeting was opened by the reading of the following paper by Mr. W. E. PARTRIDGE, who also exhibited samples to illustrate the subject treated of.

PROTECTING PLATES, OR DESIGN PLATES AS APPLIED TO ENAMELED GLASS.

For want of a better name, this paper has been announced as upon "Stencil Plates, their connection with Stained Glass work etc.;" but the plates which I shall exhibit to you this evening, are not in any sense of the word stencil plates. The technical name, though little used, is "formulas." The only resemblance which they have to stencils is in being cut from thin sheets of metal. Webster defines a stencil thus: "A thin plate of metal, leather or other material used in painting, marking, etc. The

pattern is cut out of the plate which is thin, laid flat on the surface to be marked, and the color brushed over it." Now the pattern in these plates is *not cut out* and the color is *never brushed over* them. To nearly perpetrate a bull one may say that the *plate* is cut out and the pattern remains, which is exactly the case. In no case is the color ever brushed over the plate.

In the ornamentation of glass by enameling, the first thing to be done is to clean the glass perfectly; and so thoroughly is this done, that when the glass is ready for the color it approximates to what a chemist would call clean. The colors used in glass work are minerals, oxides of the metals, and other substances capable of bearing a great degree of heat.

Indeed in the majority of cases the color does not appear until the glass has been heated to redness. The colors are mixed with various proportions of flint glass and other materials termed fluxes. These are then ground exceedingly fine. They are then mixed with gums or oils so that they can be readily applied to the surface of the glass. The next operation is termed "laying the ground" which consists in giving the glass a perfectly even coating of the enamel over its whole surface. This is done by applying the colors technically called "enamels" to the glass, by means of broad soft brushes; and then, as the coating dries, smoothing it by means of blenders—the long haired brushes used by artists for similar purposes. When thoroughly dry, and of course completely covered with the color, the glass is ready to receive the pattern. The protecting plate or design plate now comes in use. It is laid upon the glass to which it must fit very closely and the superfluous enamel *brushed away through the interstices* af the pattern; a complete inversion of stencil work, where the *color* is put on *through* the plate. The glass goes at once to the kiln to be heated or "fixed" so that the enamel which is a little more fusible than the glass melts, combining with the glass so that the pattern, becomes as undestructible as the glass itself.

These are the outlines of a process which has had its origin and growth in the glass trade, and so far as the writer knows has never been practised outside of that trade. It becomes a matter of no small importance to consider whether as valuable a process may not be applied to decorative and preservative arts, and have a wider range of use than it has at present.

In the consideration of the topic it may be well to consider first how these plates are made.

When the sheet brass comes from the manufactory, it is rolled up, and when spread out again is very rough and uneven. If made into a plate in that condition it would be utterly useless. It must, therefore, be stretched and rolled until it is perfectly flat. Ordinarily the sheet of metal is then covered with wax, and the lines requiring to be cut through are etched with acid. They cannot be cut as in stencil work, because the action of the punch or tool would so tear and injure the edge of the metal, that it would no longer fit closely upon any surface to which it might be applied. After the acid has cut entirely through the metal, the edges are carefully trimmed with a knife, and the protecting plate is ready for use.

Many of the colors when applied to the glass, have no resemblance to the intended tint. When heated, however, chemical changes take place, and the desired color appears. This piece of glass which I show you now, is covered with what will be black enamel, when it is burnt in; at present it is only a dark olive green. Nitrate of silver produces a brilliant transparent yellow, but when put on to the glass, is a dirty gray color.

The other day when showing these plates to a gentleman, very wise in his own conceit, he remarked, "oh, yes," he had made such stencils many years before. They were for etching with acid. A remark which he no doubt deemed very wise, but which showed that he knew nothing whatever about enamelling glass, and hadn't the *faintest* conception of the difference between a positive and negative pattern. Another gentleman who seemed to think that he knew a good deal about the relation of things, remarked, "yes, those were very good stencils, they could be made by rolling." It is barely possible that he would like the job of making a pair of rolls that would roll a plate just like that. To make such a plate as this, costs, perhaps, $10 for a die, with which to cut it. They are made double, male and female; and then perhaps $5 to make the plate. Total cost from $12 to $15 for the first plate, and $5, or thereabouts, for each succeeding plate. Now, if that gentleman is present, will he be kind enough to just tell us how much it would cost to make a pair of rolls that would turn out a plate 36 inches long by 15 wide? Then how much would it cost to reduce the plate to a perfect plane, so that when it is laid upon the glass, it will touch at all points? At the same time, the plate must not be distorted.

An important application of this process would be to enamel iron for buildings. The cost would be little, for the principal labor can be done by boys. An iron building can be enameled for about 35 cents per square foot; and the saving of the expense of painting would pay for that in five or ten years.

Mr. STETSON—Can it be done upon either cast iron or wrought iron?

Mr. PARTRIDGE—Either. It will be observed that one difficulty in the use of stencil plates is entirely obviated by this process; which is the necessity for breaks in forming letters or other patterns. Here the form is complete with one plate.

Mr. ——— In enameling an iron building, how would you apply the heat?

Mr. PARTRIDGE—The enamel would be applied to the iron as it came from the foundry.

Mr. STETSON—One word with regard to the enameling of iron, and the construction of iron-clad buildings. A building may be of brick, and yet plated or veneered with iron. There were whole blocks of houses made some years ago in that way, not enamelled, but so coated as to make a very perfect imitation of brown stone. The operation was briefly this: to take the same kind of varnish used in japanning, having it preferably of a light color approximating to that of brown stone; put it on thick, by one or more operations, and when the composition is a little tacky, sprinkle upon it some actual brown stone in the form of powder. This will probably endure the weather for ever, and make a very durable and substantial surface, at but little more than the expense of brick. But after all this was only a scheme; for the iron-clad houses ceased to be built, for the reason that brown stone fell to two-thirds its former price, and that killed the iron-clad houses.

Mr. FISHER—I think it is a pity that the iron-clads did not also kill the brown stone houses; for it is the ugliest color that is used in building.

The PRESIDENT—There is such a difference between the expansion of iron and any sort of enamel, that enameled iron cannot be expected to be very lasting.

Dr. BRADLEY—I recollect that when that very objection was made by Dr. RICH, it was answered by the fact that the specimen had already suffered all the changes of heat from some 200 deg. F down to zero, and still remained perfect.

Mr. PARTRIDGE stated that samples of similar work done by protecting plates in Belgium, bore no comparison, in the perfection of the coating, or in the regularity of the design, with work done from the protecting plates made by the American machine in Newark, specimens of which he exhibited.

FIRE ESCAPE.

Mr. SHARP exhibited a new Fire Escape, consisting of a brass cylinder with a spiral groove around it, the friction of which, upon a rope passing through it, is sufficient to enable a man to descend from the window of an upper story with safety. One end of the rope is fastened to a bedstead or other fixed object near the window, and the person sits in a seat formed of leather straps attached to the brass cylinder. If the descent is too rapid, a slight pull upon the rope below the apparatus will increase the friction to any desired extent. The whole apparatus, including the rope, may be packed in a small box, and weighs but about three pounds, costing about $10

The PRESIDENT—Would it not be cheaper if made of iron?

Mr. SHARP—Brass is cheaper than iron, because this screw can be finished more easily in brass. In case of a fire, if this apparatus was at hand, a man could remain in a building in flames, saving the property, until the very last minute, and then come down with safety. Even if the flames should reach the rope, he would reach the ground before it would burn.

The PRESIDENT—It would be very easy to make the rope fire proof. The proper way would be to dip the fibre, before made up into rope, and then the wear upon the outside would not affect it. This is a novel and simple invention; and its cheapness will be an important point. We have had many successful fire escapes, but they have cost too much. If this can be furnished cheaply enough to put in a closet in every house where it is needed, or in every room where it is needed, it will be of great utility. The least pressure beneath the brass stops the descent at at any point.

Dr. G. V. C. SMITH—There is a fire escape much used in England, consisting of a sort of ladder on wheels, which is run up to a window, and women and children are taken down; and I have been struck with the marvellous ease with which they manage that instrument. This apparatus strikes me very favorable. The principle is admirable; but to introduce it rapidly it must be cheap.

Mr. SHARP—When we go up into an upper story to sleep, we want something that we can depend on ourselves, in order to be relieved from the fear of the danger from a fire. We cannot avoid that fear, if we must wait for that apparatus to be brought to us before we can escape. Another use for this apparatus is for painters. We not unfrequently hear of accidents to painters in consequence of their falling from scaffolds or the scaffolds giving way, and such accidents are sometimes fatal. Let the painter attach one end of the rope and place himself within these belts, and he may then feel himself safe. In painting ships, the painter may descend by this apparatus and stop at any point, and when he wishes to come up again he can climb up the rope. The apparatus may be adapted to going down into mines or into wells. In fact, there are very many uses to which it can be applied.

Mr. ———Suppose the person descending loses his presence of mind and forgets to apply the check, would the descent be so rapid as to be dangerous?

Mr. SHARP—Descending two stories it would not; but if it was from the sixth story the descent might be too rapid. Any person on the ground, pulling slightly on the rope, can check the descent just as effectually as the person descending. Usually, in a case of fire, a man wants to come down pretty fast.

Mr. ———I have seen the apparatus used in London, and which has been spoken of. It is clumsy, awkward and cumbrous. When attached to a building it is exceedingly safe; but I have known of persons being burned to death in East London while the apparatus was finding its way to the fire. One great advantage of this new apparatus is that the individual needs no assistance.

Mr. SHARP—When one man has come down, another can draw up the brass by the rope, attach the other end, and slide down the other way. It works equally well in both directions.

A paper from Dr. FEUCHTWANGER, from Savannah, Ga., was then read, but as it related to the lumber trade, it is inappropriate for our columns.

The value of yeast as a medicine in the disease known as *diabetes* was then discussed, the PRESIDENT, DRS. SMITH, VAN DER WEYDE and RICHARDS taking part in the discussion, which possessed but little interest for engineers. The property of yeast of con-

verting sugar into carbonic acid and alcohol is the reason that it is recommended in this disease. The PRESIDENT read a portion of a pamphlet by Professor HUXLEY, of London, on the subject.

Dr. VAN DER WEYDE exhibited some specimens of extract of meat from Texas.

The PRESIDENT remarked that the statement that gelatine possessed the same heating properties as starch was erroneous. The meeting then adjourned.

Prof. J. P. Lesley's Address to the American Institute of Mining Engineers.

MR. CHAIRMAN AND GENTLEMEN OF THE ASSOCIATION :

The agreeable duty of welcoming you to Philadelphia has fallen to my lot, as Chairman of the Local Committee for providing for your entertainment while in this city.

We have no doubt that many of its citizens will show an enlightened interest in your proceedings, and a cordial sympathy with the spirit of your organization.

Of all the cities of the Union, probably Philadelphia is the one most likely to be benefitted by the high-breeding of American Mining Engineers ; as it has been in past times the one most fertile in producing first-class Civil Engineers.

Philadelphia is at present the headquarters of the science of railroading on this side of the Atlantic.

Philadelphia is also the headquarters of Coal Mining, and of American Metallurgy in its most important branch, that of the Iron Manufacture.

Philadelphia contrasts with New York in being a great workshop ; whereas New York is the great warehouse. Every thing relating to the finding, and getting, and transporting of the raw materials of the mechanic arts, touches her to the heart. Her steam engines, locomotive and stationary, depend for life on coal mines. Mining engineers are therefore, in a sense, her family physicians.

On the other hand, her shops use so much iron, that a back country of blast furnaces is as necessary to her sustenance, as fields are to a barn, or rivers to the sea. Metallurgists are, therefore, her quartermasters.

Gentlemen, the citizens of Philadelphia would commit no extravagance if they made a holiday of the day when the American Association of Mining Engineers and Metallurgists first holds one of its quarterly meetings in the hall of the old University of Pennsylvania. Nor would it meet with the disapprobation of enlightened people were some of the city wealth, often misapplied to less essential or more private ends, invested in the permanent establishment of your association here. So great a city, and so dependant on mines and minerals, could do worse things for itself than to foster an institution intended to comprise in its membership the best thinkers, the most experienced experts, and the most responsible overseers in our Mining and Metallurgical world.

Gentlemen, I hope to live to see a revolution in American sentiment in this particular, and even an advance upon that enlightened policy which has sometimes regulated the conduct of less free governments. There are parts of the world where the most respected and encouraged are those who show themselves most able, by judgment, energy, experience and learning, to benefit society.

The time will come when the raw republicanism of these States, too much soured by political fortune-hunting, will ripen into a wise appreciation of what is due to those who fit themselves for real usefulness with an honest devotion to the best arts of life.

I wish that we could welcome you to a hall built for your use by the Mayor and Select and Common Councils of Philadelphia out of the city funds ; furnished with a library containing all the books that have been written by experts in your profession ; with a museum exhibiting all the minerals in the regions in which you exercise it ; with models of all the best machinery and methods of mining known in Christendom : models of every process used in the smelting and working of metals ; models of every structure in civil engineering ; and a laboratory for those still needed investigations into the secrets of that affluent nature which it is your profession to subdue and occupy.

Awaiting such enlightened action of our Councilmen, we can promise you, gentlemen, this at least : That the University, under whose roof you are assembled, shall, before very long, initiate for itself such action. Its Trustees tell us that we are here to have the great School of Mines of the United States. They will show you their new buildings already under roof. They are earnestly inquiring for the best experts to occupy the chairs of its faculty of physical sciences.

If men be selected to fill these chairs, not for their showy qualities, but for their profound learning, for their investigating genius, for their practical acquaintance with the applications of Science to the Great Arts, and for their personal power to inspire their disciples with an enthusiastic longing to know what is already known, discover what is not yet known, invent improved processes, and direct difficult operations under-ground and above-ground—then your periodical meetings here will not only be welcomed by us, as it is to-day—the harbinger of progress—but will afford great advantages for carrying into effect the designs of your organization, as an Association of Experts.

You may habituate yourselves to consider this your main rendezvous ; and you cannot fail, in course of time, to make a deep mark on the history of the prosperity of Philadelphia.

Gentlemen, I assure you, there are not a few of our citizens who hold this prospect in view, and their welcome to you to-night is cordial accordingly.

I have used the word *Experts*. It is a fine old scholastic term, retained, with good reason, by our courts of law. *Experitus :* A man who has come through, and gone out at the other side of an art, or a profession. No man should be satisfied with less for himself. A half-through man is like a half-done cake : no stomach but that of a barbarian can digest it. *Thoroughness, thoroughness*, should be the watchword. It should stand on the seal of your diplomas, should you issue diplomas. Society stamps the word unconsciously on the face of that unwritten diploma, bestowed by acclamation on any one whom all men can recognize as a Master in Science or in Arts. Thoroughness is the only ambition worthy of a human mind. It is the ascending arrow just disappearing in the clouds with the old German motto under it, "*Es wird durch.*"

I need not remind you that a want of this thoroughness characterises our American life. We cannot endure apprenticeship. Yet without long, painful, self-denying, humble, docile apprenticeship, no mastery of any art or science can be reached. But we, in this fine, fresh, free new land, are too impatient of control, too versatile in our pursuits of knowledge and of art, too proud of the exercise of our half-trained powers, too sorely tempted by the money offers of society around us, to wait and work and learn and be subjected to the experience of masters.

American society names every fellow a captain or a colonel who has been out in an emergency ; dubs anybody a doctor who wears spectacles ; will entrust to a foreign miner who never bossed half a dozen breasts in his own land, the superintendency of a colliery ; and send the first charlatan that offers himself to decide upon the plant of half a million in iron works, or gold and silver mines.

The man who can merely assay the quantity of crude lead in a cube of galena, may place himself, with the connivance of society, on a par, in public, with the chemist who has discovered the chlorine process for reducing silver ores.

It is not so bad as it used to be, but it is bad enough. *Everything* used to be done by rule of thumb. *Some* caution is now exercised by heavy investors of capital in employing experts. But an immense advance must yet be made before public sentiment can be brought to consent to accept men in grades according to their progress in science and the arts, willing that that progress should be stamped with proper marks of authenticity for them by competent judges.

Gentlemen, the prime necessity for such an association as yours arises out of this state of affairs; this fashion of confounding the expert with the charlatan—the ill-bred pretender with the thoroughbred man of science and art.

In an age, grown up like this, to a rage for classification, the classifiers themselves must not hope to remain unclassified.

There is going on just now in England a little controversy : whether mathematicians may be separated into three classes—Inventors, Experts, and Readers or Students ; or into only two—Creators and Students. The question may be asked regarding any science and any art. It is a war of words ; but it is fought with serious weapons. For such distinctions are not only realities, but most important realities. They exist in nature—that is, among men ; and they ought to be recognized by a universal popular sentiment. They are not so much three exhibitions of human mental abilities as three stages of intellectual progress. They are three propylæa under which all novitiates must walk, in a very slow-moving procession, who pretend to reach and worship at the shrine of Mut, the Goddess of Truth. They are three initiations of that Freemasonry which has laws not to be eluded by the most astute quackery.

This association should be one of the bulwarks of these laws. Science and the Arts are aristocratic and hierarchic by nature. They will not submit to be re-organized as democratic institutions. Humility, subjection, docility, obedience—of the class below to the class above—of the mere reader or student to the practised expert ; and of the mere expert to the genius who invents, foresees and comprehends, what is out of the reach of other eyes—these are very conditions *sine quâ non* of a successful adoption and prosecution of the engineering science and art in any one of its several branches.

The French language uses, with singular insight, the word *génie*, genius, to express the physical sciences in application to the higher arts. But it is a genius not born, but made. It is a plant of slow growth. Jugglers in India sow seeds before your eyes, and make them sprout, and branch, and grow fruit while you are looking on. Such tricks are also attempted every day among us in engineering, in geology, in metallurgy. And they succeed before the mixed audiences of the business world. But, gentlemen, you are welcomed to Philadelphia to-night, not as a troupe of jugglers, but as associated scholars, experts, inventors in those sciences on the real and proper application of which depends the wealth of thousands of its capitalists, and the happiness of tens of thousands of its homes.

We live in a day of the long history of mankind marked in red, like a rubric at the opening of a chapter. Thousands of chapters in this history precede ; who knows but thousands are to follow?

This we know, that the present chapter is to be a long one. Like some of the chapters of the Egyptian Dead Book, which are ornamented on top with pictures of their subjects, there stand as the running head to this 19th century, such objects as the iron rope—the can of nitroglycerine—the Bessemer converter—the spectroscope—the narrow-gauge locomotive for underground work—the rope tramway—the solar compass—the dipping needle—the new chemical nomenclature, &c., the last bearing a striking likeness to the hieroglyphics of the Pharaonic Ritual. A clear case of DARWIN'S reversal of types!

A chapter of history with such a heading cannot be a short one. It must be one of the longest. It concerns, too, the settlement of an entire continent capable of feeding as many millions as Assia or

Africa now feed. This planting of mankind is slow work. It is like filling a wide reservoir from one or two inlets. Men repel each other like the particles of an elastic gas, and occupy any amount of free space; but the gas—the population—is rare or dense according to the space to be filled.

Now, you will not find it, I think, formulated in the books, but it seems to me justified to any thinking mind, that all the great advances in science and art have taken many centuries to become the common property of millions of men. They come to a sort of *first* perfection very rapidly, and among a few; their complete illustration and general application to whole nations is an exceedingly tedious operation. The new sciences centralise themselves in certain favorite and congenial places, usually great cities; while whole regions continue for generations to regard them from afar with scarcely even curiosity. I consider it a mistake to suppose that these United States are enjoying an exceptionally rapid progress in civilization merely because cities spring up suddenly here and there, and great continuous lines of railway transportation stretch across the interior from Atlantic to Pacific and from the lakes to the gulf. We judge of the dryness of the atmosphere by the length of the thunderbolt. We are hastening to completion our main through lines, not for the benefit of the whole country, but for the instant convenience and pressing emergencies of widely-separated centres of population.

All history teaches that it is not among a scattered people the Arts and Sciences develop. The civilization of Thebes and Babylon and Benares took place precisely in the only three river deltas where the ancients not only *could* increase and multiply greatly and rapidly, but were compelled to do so by being walled in with surrounding uninhabited deserts and snow-clad mountains. And in modern history the most splendid achievements of the Arts and Sciences, I mean in relation to the entire life of a nation, have not occurred among the free citizens of these States, but among the restrained populations of Germany, the crowds packed together on the delta of the Rhine, or shut up in the narrow confines of the English Islands. The grand Arts and the Sciences have a hard struggle, and will continue to have a very hard struggle, among us Americans.

But on the other hand their fields are large. We are usually called to exercise our profession in this country in a sort of grandiose style, which excites enthusiasm, while it carries certain dangers with it. In a democracy like ours we can never hope for much pecuniary reward; politicians and speculators will see to that. But no man can honestly go up through the three initiations without making a sufficient livelihood, and gaining the solid and lasting esteem of his fellow-citizens and fellow-countrymen.

While a mere reputation for genuineness will not feed one's family, nor the love of science stand in place of the comforts of home, it is something to be thankful for, this intellectual converse with the secret mind of the Creator, this exercise of professional genius in playing itself the creator of visible history. Happily, we are men fated to be conscious of breathing a superbly fresh and healthy atmosphere of knowledge compared with that of past ages, loaded with the miasmata of ignorance and superstition. We can repeat, and in a far truer sense than his, the verse of the old Christian Father PRUDENTIUS:

"The Delphic Caves have become silent; no tripod rattles; no mephitic gas steams up its absurd sayings to be entered in Sibylline books. The lying Dodona has lost its insane vapors."

"Perdidit insanos mendax Dodona vapores." (Apoth. 438.)

Gentlemen, we rejoice that there is no crack in the floor of your place of meeting over which rods must be placed to prevent your falling into unfathomable abysses whenever the divine afflatus is upon you—no tripod—no winding snakes—no images of Apollo—no Delphi—no superstitions of the cave to stand in the way of your discussions. In heaven's name, then, discuss everything, and let the world have the benefit of it, after you have had the pleasure and, I reverently add, the labor of it first.

I need hardly add that another prime necessity for your association springs from the common demand of the heart for sympathy, and of the understanding for consultation, compensation, discussion. I congratulate the civil and mining engineers and metallurgists of the United States on being no longer bachelors—on being married at last to one another. It is not good for men to work alone. It breeds sickly fancies. It fosters self-conceit. People have remarked that clergymen cannot bear contradiction; and that lawyers enjoy it. Ill temper has nothing to do with this polar phenomenon. Simply, clergymen study and teach, each man by himself, unconfronted except by a speechless, submissive and sympathetic audience; whereas a lawyer can never study anything except in the face of conflicting doctrine or practice, and can never make any assertion of fact without its being at once called in question in the presence of his equals and superiors at the bar or on the bench.

The amount of benefit, gentlemen, which you will get out of these meetings, permit me to suggest, will always be very much in proportion to the amount of amiable contradiction in which you can find good heart to indulge. There should be no timidity in the expression of any opinion, and not the slightest offence felt from any amount of contra-assertion. For the divine rule is everywhere a good one. Out of the mouths of many witnesses the truth gets thus established. The love of truth after all is the best heritage of man, and a passion for truth, fact, reality, is surely the very chariot on which genius rides forth to all its victories.

Mining in Colorado.

Professor A. P. ROCKWELL, of the Massachusetts Institute of Technology, has written the following letter in reply to a communication of a certain Mr. SHERMAN, whose feelings seem to have been hurt by some of the Professor's remarks. Both communications alluded to appeared first in the *Colorado Transcript*:—

Boston, January, 1872.

TO THE EDITOR:—Sir—My attention has been called to a communication published in a recent number of the *Transcript* in which exception is taken to some remarks which I am reported as having made before the Society of Arts of the Massachussetts Institute of Technology about the mines of Colorado. The statement which I made was verbal, not written, quite below the dignity of a report, and the impression intended to be conveyed was favorable rather than unfavorable as regards the future of that region.

The opinion prevails at the East that there are *no* good mines in Colorado. I stated, on the contrary, that there *are* good mines there,—that is, mines which with proper management will pay dividends; but Eastern stockholders at least would be surprised if told that a majority of the mines do to-day pay dividends upon the cash capital invested. That failure has been the rule and success the exception *in the past*, is a simple fact, and it was to the past the remark applied. The mining interests of Colorado are now reviving from the collapse which followed the earlier unfortunate speculations. It is every way desirable that this revival should be made a healthy, permanent development of the mineral wealth that actually does exist there, and that a return of the wild speculative fever be prevented. Every true friend of Colorado would therefore understate rather than overstate facts.

The complex character of much of the Colorado ores increases the cost of extracting the gold and silver. The first-class, or high-grade ore, is smelted. The Boston & Colorado Smelting Company, at Black Hawk, charges thirty-five dollars per ton for treating all ores yielding by assay fifty dollars or less per ton, and proportionately more for richer ores. Now the proportion of this first-class, or smelting ore, is stated in Hague's Report (Fortieth Parallel Survey) to be, in certain mines, ten per cent, but in the majority of mines from two to three per cent. only of the ore taken out.

The remainder, which cannot at present be profitably smelted, constitutes the bulk of the ore. It is commonly stamped and amalgamated. The percentage of gold saved in the stamp mills, where the tailings are not worked over, is variously stated. Professor HAGUE gives it as probably fifty-five per cent. of the gold which the ore contains, and he had his figures from sources as reliable as any in Colorado. If this is correct, there is clearly room for improvement in the method of treating the ore, or the amount of gold in the ore sent to the stamp mills has been overestimated.

Experience elsewhere has gone to show that those mines are, in the long run, the most successful which yield ore, comparatively poor it may be, but in such quantities that by close economy and careful treatment a moderate but steady profit may be made. I think that I was, therefore, correct in saying that the successful treatment of this large quantity of non-smelting ore (it is immaterial whether we call it *low-grade* or not) would do more than any other one thing to insure the solid prosperity of Colorado, and make mining a permanent industry.

Each year lessens somewhat the cost of materials and of living, and hence it becomes possible, more and more, to treat profitably ore which had hitherto been thrown aside.

The institute has no other purpose in this matter than to promote the best interests of Colorado.

Respectfully yours,

ALFRED P. ROCKWELL,
Professor of Mining.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. It is believed that several names of members and associates elected at the Bethlehem meeting in August, 1871, have been accidentally omitted by reason of the loss of a portion of the records of that meeting, Such persons, or their friends, are requested to communicate with the Secretary.

II. All members and associates who have not paid their dues are requested to do so at once, by sending in postal orders, or check, or money, ten dollars to the Secretary.

All members and associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute, and all notices of meetings. Back numbers cannot, as a general rule, be sent.

III. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or semi-annual volumes, to which those members and associates will be entitled who have paid their dues.

IV. Authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

MARTIN CORYELL, Secretary, Wilkesbarre, Pa.

DR. CROOKES, editor of the *Chemical News*, has just published in pamphlet form a reply to the criticisms on his papers regarding "Psychic Force."

THE total production of coal in Germany during 1870 was 23,000,000 tons raised by 107,682 workmen.

THE COAL TRADE.

Anthracite Coals.

NEW YORK, February 23, 1872.

WHOLESALE.—As usual just before one of the monthly sales of Scranton coal there has been but little activity in the coal trade. From the announcement in another column, it will be noticed that a hundred thousand tons of coal are to be sold at auction next Wednesday. The amount is considerably less than last month, and so far as this goes it is an encouraging sign for advanced prices, yet even a hundred thousand tons is a great deal of coal to put on the market at one time and we cannot see that an advance is probable. If the weather had remained as warm as it was during the first part of the week, navigation might have been opened to some points which are now cut off, and we might have had a demand for coal for shipment to them. The present cold snap, however, has put an end to any such hope and the market will continue to be confined to New York and the immediate vicinity.

On the 20th the Pennsylvania Coal Company fixed their prices to contractors for March, which we quote as follows: Lump $3 80, Steamer $3 80, Broken $3 95, Egg $4 05, Stove $4 30, Chestnut $3 80. Twenty (20) cents per ton deduction from the above prices, will be made on coal taken at Newburgh, should the navigation open, to allow shipments at that point, at any time during the month of March.

By reference to our tables it will be seen that the amount of coal shipped during the week exhibits an advance of about 32.000 tons as compared with last week.

Bituminous Coal.

There is scarcely any change to note in the market for these coals. In spite of the continued depression of the anthracite trade, they remain unaffected.

Tolls on Coal.

The Central Railroad of New Jersey have changed the local freights to certain points on their line. From Phillipsburg to Newark the rate is now $1 31 per ton, to Communipaw $1 50, to Jersey City $1 50, to Elizabethport (for shipment) $1 05, to Port Johnston (for shipment) $1 05

The New Jersey West Line road now takes coal to certain points on the line.

The following rates are charged by the DELAWARE, LACKAWANNA AND WESTERN R. R. COMPANY.

Stewartsville and Broadway	$0 60
Washington	80
Port Murray and Hackettstown	1 00
Andover	1 95
Newton	2 25
Waterloo	1 15
Stanhope	1 25
Drakesville	1 30
Chester	2 00
Succasunna	1 70
Port Oram and Dover	1 45
Rockaway	1 55
Denville and Boonton	1 65
Beavertown and Whitehall	1 70
Paterson	1 55
Bergen Siding	1 85
Clifton, Morris Plains, Morristown and Madison	1 75
Chatham, Summit, Milburn and South Orange	1 75
Orange	1 75
Bloomfield	1 70
Montclair	1 80
Newark	1 31
Hoboken for consumption	1 60

As per Circular dated February 1st, 1872.

B. A. HEGEMAN, G. F. A.,
26 Exchange Place, N. Y.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 17, 1872, compared with week ending Feb. 18, 1871.

COMPANIES.	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	....	.....	....	.....
B. & O. R. R.	8,850	72,227	19.434	122.498
H. & B. T. R. R.	5,021	29,961	5,023	36,584
*Harrisburg & D	7,185	52,001	5,640	110,419
*L. V. R. R.	2,845	5,484	796	24,447
P. & N.Y.C. & R. Co.	....	30,084	....	....
Cumberl'd Branch Canal	....	.....	....	.....
" Railroad	....	.....	....	.....
Total	23,901	189,757	30,893	294,0'8
			23.801	189,757
Decrease				
Increase			6,992	104,291

The tonnage of the P. & N. Y. C. & R. R. Co. is included in that of the L. V. R. R. Co.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coa passing over the following routes of transportation for the week ending Feb. 17, 1872, compared with the week ending Feb. 18, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R.R†	15,153	555,729	70.170	581,025
Schuylkil Canal	....	.....	.....	.....
*Lehigh Valley R. R.	2,910	338,027	45,281	559,265
Lehigh & Sus. R. R.	431	56,356	15,087	148,401
Lehigh Canal	....	.....	.....	.....
Scranton North	....	3.521	12,000	85,778
" South	....	137	33.542	258,691
Penn. Coal Co., rail	....	2,761	16,317	121,387
" " " canal	....	.....	....	....
Del. & Hud. Canal Co.	....	.....	....	....
" East	....	48.332	7,728	70,317
" " West	....	12,741	8,775	50,134
" " South	....	.....	6.597	47 827
Shamokin	6,283	39,441	8,750	39,557
Trevorton	....	....	....	....
Lykens Valley Coal Co.	314	10,046	....	62
Wyoming South	....	.....	....	....
Wyoming North	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	32,281	....	....
Williamstown Col'y	....	17.847	....	....
Big Lick Col	1,227	12,387	....	4,256
Total	26,318	1,129,585	224,297	1,966,700
1870	....	....	26,318	1,129,585
Decrease				
Increase			197,879	837,115

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Co's use and Bituminous coal.

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE
For the Week ending Saturday, February 17, 1872.

BY RAILROAD—ANTHRACITE.
PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	22,192 13
" Port Carbon	4,786 14
" Pottsville	
" Schuylkill Haven	17.784 00
" Pine Grove	2,089 18
" Tamaqua	10,994 04
" Harrisburg	
" Dauphin	1,326 12
Total	59,174 01

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	
" Mill Creek "	
" Schuylkill Valley Scales	
" Mt. Carbon "	
" Cressona "	
" Pine Grove "	
" Tamaqua "	.....
Total	

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	575 00
" Shamokin	4,810 12
" Herndon	.....
Total	5,385 12

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	753 02
" Lebanon & Pine Grove Branch	616 06
Total	1,369 08

CONSUMED ON LATERALS.

From Frackville Scales	155 12
" Mill Creek "	729 06
" Schuylkill Valley Scales	815 05
" Mt. Carbon "	483 13
" Cressona "	218 04
" Pine Grove "	34 03
" Tamaqua "	324 07
Total	2,760 10

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a br.	33 11
" " Alburtis, "	
" " Oreland, G. & N. Br.	1,135 02
" " Connecting R. R.	.....
" " Willow Street R. R.	311 18
Tota	1,480 11

BITUMINOUS.

From Harrisburg	5,590 11
" Connecting R. R., G. & N. Br.	
" Junction R. R.	59 17
Total	5,640 08

COAL FOR COMPANY'S USE.

Anthracite	2,480 02
Bituminous	302 06
Total	2,782 08

RECAPITULATION

	Total for Week.	Corres-p'g week last year.	Increase and Decrease.
Passing over Main Line and Leb. Val Branch	59,174 01	9,148 19	i 49,725 02
For Shipment by Canal			
Shipped Westward via Northern Central R. R.	5,385 12	3,442 00	i 1,943 12
Shipped West or South from Pine Grove	1,369 08	918 08	i 451 00
Consumed on Laterals	2,760 10	1,306 06	i 1,454 04
Lehigh and Wyoming Coal	1,480 11	37 12	i 1,442 19
Total Anthracite paying freig't	70,170 02	15,153 05	i 55,016 17
Bituminous	5,640 08	7,185 08	d 1,545 00
Total of all kinds paying freig't	75,810 10	22,338 13	i 53,471 17
Coal for Company's use	2,782 08	2,452 15	i 329 13
Total Tonnage for Week	78,592 18	24,791 08	i 57,801 10
Previously this year	659,463 03	621,127 02	i 38,336 01
Total to date	738,056 01	645,918 10	i 92,137 11

SHIPPED BY CANAL.

From Schuylkil Haven			
" Port Clinton			
Total Tonnage per Week			
Previously this year			
Total to date	13,355 16	36,225 17	d 22,870 01

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Feb. 17, 1872.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	16,316 16	121,386 10		2,760 14
" Canal				
Total	16,316 16	121,386 10		2,760 14
Increase 1872	118,625 16			

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Feb. 17, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	9,002 04	104,779 13
" Hazleton	33,435 06	350,051 12
" Upper Lehigh	65 04	682 19
" Beaver Meadow	10,149 06	137,093 05
" Mahanoy	1,924 04	45,063 07
" Mauch Chunk	132 09	627 17
Total	54,700 11	638,238 13
Same time last year	3,593 14	387,226 08
Increase	51,106 17	251,012 05
Decrease		
Forwarded East from Mauch Chunk by rail	45,280 12	559,265 05
Same time last year	2,910 18	338,026 17
Increase	42,369 14	221.238 08
Decrease		

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	44,636 19	547,584 09
do East for use L. V. R R	643 13	11,680 16
Delivered at and above Mauch Chunk for use of L. V. R. R.	790 05	12,886 11
To P. & N. Y. R. R	7,176 15	49,702 17
To N. C. R. R., at Mount Carmel		73 06
To D. H & W. R. R.	486 15	2,649 19
To L. & S. R R. at Packerton for rail	338 09	2,952 13
Delivered at M'h Chunk	17 04	522 14
Delivered on line of road above Mauch Chunk	482 04	5,474 16
To L. & S. R. R., at Penn Hav., for railroad	128 07	3,766 18
Do. for canal		864 07
To Lehigh Canal Mauch Chunk		99 07
Total	54,700 11	638,238 13

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending Feb. 17—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct	WEEK 1871. tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons. cwt.
Wyoming Region	10092 07	383 06	129643 06	39676 04
Upper Lehigh Region	3297 16		22234 13	4614 03
Beaver Meadow Region				
Hazleton Region	370 17		1951 16	704 05
Mahanoy Region				
Treskow Region			5309 03	1043 03
Mauch Chunk Region	5573 06	373 18	24973 04	15864 02
Totals	19334 06	757 04	184110 02	61802 00
Increase	18577 02		122308 02	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	15087 01	431 19	148401 04	56355 11
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	621 12	196 07	7719 17	4040 15
L. V. R. R at Packer'n	434 12	218 18	1806 17	1405 14
Delivered to L. & B. R. R. at Plymouth Bridge	3191 01		26182 04	
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co.	5573 06	373 18	29391 18	17100 09
W.-B. C. & I. Co.	6264 07		91242 01	30653 18
Totals	11837 13	373 18	120633 19	47959 08
Increase	11463 15		72574 12	
Decrease				

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Feb. 17, 1872.

	WEEK.	SEASON.
North	46,819 18	319,876 16
South	6,597 01	44,053 19
Total 1872	53,416 19	363,930 15
Corresponding time in 1871:		
North	Suspension.	
South	"	
Total		
Increase North		
Decrease North		
Increase South		
Decrease South		
Total decrease 1872		
Total increase 1872	53,416 19	363,930 15

Delaware and Hudson Canal Company.

The following is a statement of Coal Transpo ted by the Delaware and Hudson Canal Co. for the week ending Feb. 17, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,		
By Railroad, East	7.728	70,317
" " West	8,775	50,134
" " South	6,597	47,827
Total Tons	23,100	168,278
For the same period last year.		
	FOR THE WEEK	FOR THE SEASON.
By Delaware and Hudson Canal,		
By Railroad, East		48,332
" " West		12.721
" " South		
Total Tons		61,053
Increase		107,225

Shamokin Coal Trade.

For week ending February 17, 1872	8,750 16
Same time last year	6,283 04
Increase	2,467 12
Decrease	
Total amount shipped to date	39,556 18
Same time last year	39,441 07
Increase	115 11
Decrease	

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S. Div. of Central Railroad of New Jersey for the week ending Feb. 17, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of Mauch Chunk by Rail	15,087	148,491
Delivered at and above do.,	621	7,719
Forwarded East of do., by Canal..	....	....
	15,708	156,121
Corresponding period last year—		
Forwarded East of Mauch Chunk by Rail	431	56,355
Delivered at and above do.,	106	4,041
Forwarded East of do., by Canal..	....	....
	538	60 396
Increase on Railroad	15,170	95,724
Decrease " "		
Increase on Canal		
Decrease " "		
Of the above there was transported on account of—		
Lehigh Coal Nav. Co.	5,573	29,291
Wilkesbarre Coal & Iron Co	6 264	91,242
	11,837	120,533
Corresponding period last year—		
Lehigh Coal Nav. Co	373	17,100
Wilkesbarre Coal & Iron Co.		30,858
	373	47,959
Increase	11,463	72,574
Decrease		

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna and Western R. R., for week ending Feb. 17, 1872 :

	Week. Tons. Cwt.	Year. Tons. Cwt.
Shipped North	12,049 14	85,778 05
Shipped South	33,542 00	258,690 12
To'al	45,591 14	344,468 17
For the corresponding time last year:		
Shipped North		
Shipped South		
Total	2,719 18	3 657 12
Increase	42,871 16	340,811 05
Decrease		

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Feb. 17, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B.&O.R.R. Co Tons. Cwt.	Total. Tons. Cwt.
1872	.....	19,433 17	19,433 17
1871	.....	8,850 02	8,850 02
Increase		10,583 15	10,583 15
Decrease			

YEAR.

1872	.....	122,597 16	122,597 16
1871	.....	72,226 14	72,226 14
Increase	.....	50,371 02	50,371 02
Decrease			

Huntington and Broad Top R. R. Co.

For week ending Feb. 17, 1872	5,623 tons.
Same time last year	5,021 "
Increase	"
Decrease	2
Total amount shipped to date	36.584 "
Same time last year	29,961 "
Increase	6.923 "
Decrease	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, Feb. 23. R. A.	W. A.	AT PHILADELPHIA. Feb. 23. R. A.	W. A.
Lump	$- —	$- —	- —	
Steamer	- —	- —	- —	- —
Broken	- —	- —	- —	
Egg	- —	- —	- —	- —
Stove	- —	- —	- —	- —
Chestnut	- —	- —	- —	
Pea	- —	- —	- —	- —
LEHIGH.				
Lump, (along side)	5 00	— —	- —	- —
Broken	4 75	- —	- —	- —
Egg	4 50	- —	- —	- —
Stove	5 25	- —	- —	- —
Chestnut	4 25	- —	- —	- —
Pea	- —	- —	- —	- —
SPECIAL COALS.*				
Honey Brook, Le'h W.A.	4 00@4 75		- —	- —
Spring Mountain " "	- —@- —		- —	- —
Sugar Creek " "	- —@- —		- —	- —
Sugar Loaf " "	- —@- —		- —	- —
Old Comp'ss " "	4 00@4 75		- —	- —
Room Run " "	4 00@4 75		- —	- —
McNeal " "	- —	- —	- —	- —
Girardville " "		—	- —	- —
Hill & Harris " "		- —	3 10@4 00	- —
Shamokin " "		- —	- —	- —
Lykens Valley " "		- —	- —	- —
Broad Top " "		- —	- —	- —
McMichael " "		- —	3 25@4 25	- —
Henry Clay " "		- —	- —	- —
Powelton "		- —	- —	- —

Dealers in these coals may be found in our advertising columns.

Company Coals.

Feb. 1872.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	3 39	3 77	3 63	4 02	4 10	3 34
*Pittston at Weehawken	4 00	4 00	4 15	4 25	4 50	4 00
*Lackawana at Weehawken	3 75	3 75	3 85	3 85	4 25	3 75
Wilk'b're at Hoboken	3 75	3 75	3 85	3 85	4 25	3 75
Old Co. Lehigh at PtJohn'n	4 75	—	4 00	4 00	4 50	4 00
Lehigh at Eliz. Port	4 75		4 00	4 00	4 50	4 00

For freights to different points see "Freights."

* To contractors only.

Prices of Gas Coals.

Feb, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y.

Duty, $1 25, gold

	Coarse	Slack.
Block House	$1 60 @-1 75	
Gowrie	1 60 @-1 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 60	@- 80
Little Glace Bay	1 60	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal

AMERICAN.

	Currency.
Westmoreland	$7 00 @- —
Fairmount Gas Coal Co. of N. Y.	7 00 @- —
Despard Coal Co.	7 00 @- —
Penn	7 00 @- —
Newburg Orrel Gas	- — @- —
West Fairmount Gas Coal	7 00 @- —

AT PHILADELPHIA.

Powelton	$6 75

TO NEW YORK.

Provincial.	
Sidney	$3 25
Lingan	3 25
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25

Prices of Foreign Coals.

Feb, 1872.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	18 00@20 00
" Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
"Cannel, "	20 00@25 00

Per ton 2,000 lbs. delivered.

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption	$1 25
For reshipment	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 61
C. R. R., N. J., Phillipsburgh to Elizabethport	0 95
Shipping expenses at Elizabethport	75
Wharfage	10
Total	$1 94

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & N. R.R. from M. C. to Phillipsb'g	$0 64
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 95
Shipping expenses	25
Wharfage	10
Total	$1 94

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Phillipsburgh	64
Morris & Essex R. R. Phillipsburgh to Hoboken	0 95
Shipping expenses	25
Wharfage	10
Total	$1 94

TO SOUTH AMBOY.

L. V. R. R.	72
R. & D. R. R. / Cam. & Am R. R.	91
Shipping Expenses,	35
Total	$1 08

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 75
C. RR. of N. J. Phillipsburgh to Elizabethport	0 95
Shipping expenses	25
Wharfage	10
Total	$ 2 05

Freights.—Feb. 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Philadelphia.	Anthracite. From Elizabeth Port, Perth Amboy and Hoboken.	Anthracite. From Newberry...	Anthracite. From Rondout...
Amesbury						
Bangor						
Bath						
Boston		3 85		2 75		
Bridgeport		3 25				
Bristol						
Derby						
Dighton						
East Cambridge		3 50				
Fall River						
Hackensack		3 25				
Hartford						
Hartford	2 25					
Jersey City		2 25		55		
Middletown						
Mystic						
New Bedford		3 50				
Newburyport		4 25				
New Haven		3 25		1 00		
New London		3 25	3 50	1 25		
Newport				1 60		
New York		2 50		55		
Norwalk				1 05		
Norwich						
Pawtucket						
Portland		4 00		2 50		
Portsmouth, N.H						
Providence		3 25		1 60		
Rockport						
Saco						
Sag Harbor						
Salem		4 00		2 75		
Stamford						
Stonington				1 50		
Taunton						
Warren						
Washington						
TO RIVER PORTS.						
Albany						
Catskill						
Cocksackie						
Coeyman's						
Cold Spring						
Fishkill						
Haverstraw						
Hudson						
New York						
Nyack						
Poughkeepsie						
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy						
West Point						
Yonkers						

MARKET REVIEW.

FOR THE WEEK ENDING FEBRUARY 24, 1872.

IRON.—The demand for Scotch Pig continues light, there being no inquiry except for small lots to meet the wants of consumers. The supply, however, is not large, and as the advices still quote advancing foreign markets prices here are very firm ; 500 tons Eglinton in lots sold at $38a$39 50, and is now held at $40—other brands remain as last quoted ; 160 tons Glengarnock sold at $42, 3 mos. ; interest added. The transactions in American have been limited by the light supply, and prices have further appreciated ; we quote No. 1, $42a$43; No. 2, $40a$41 ; and Forge $39a40, with very little to be had at these figures. Wrought Scrap is scarce and in demand, at advancing prices ; we notice sales of 200 tons from yard at $52 50, cash. There has been a little more inquiry for new rails, and prices are firm at the recent advance ; sales are rumored of 5000 tons 56 pounds English, and 2000 tons English, but we are unable to learn any further particulars : old are in limited supply, and steady at $46 50a$47, gold. The market continues very strong at the late improvement, and looks as if a further advance were inevitable. In Philadelphia the price of Refined bar is 4,cents and Pittsburgh 4 3-10 (Pittsburgh classification), and from Liverpool we have a cablegram quoting £12 10 s., and difficult to fill orders at any price. Steel also advanced there 10s. on common, and 20s. on best quality. A sale of 100 packs No. 1 Stained Russia Sheet sold at 14 cents gold. Common Sheets are firm at our quotations.

PHILADELPHIA, February 19.—The following is from the weekly circular of Edward Samuel : Prices have again advanced throughout the entire list. There have been no large sales of pig iron, but holders are firm at the advanced figures. Old rails are in good demand at $50 currency, for shipments nearly due. Wrought Scrap—The market is bare . sales of several hundred tons extra on the spot were made at $47,'currency, and lots to arrive are held at that figure. The closing prices are for American No. 1 Foundry pig $40a41 and No. 2 do. $39a $40, No. 3 Forge)37a37 60, and No. 4 White and Mottled, $35a$36 ; American refined bar (mill price) $87 50a$90, common $80a$82 50, and rails, at mill, $75a77.

LEAD.—The market for pig remains very dull, and we hear of no sales ; ordinary foreign may be quoted nominally $5 87½a$6 gold. Bar, pipe and sheet are steady at previous quotations.

COPPER.—At a meeting of the Manufacturers on Saturday prices of all manufactures were advanced two cents per pound, and we now quote Sheathing over 12 oz., 36 cents ; bolts 38 ; nails 42 ; braziers, ordinary size, over 16 oz. square foot, 33 ; 16 and over 12 oz. 41 ; all sheets 12 oz. per square foot and lighter, 44 ; circles less than 84 inches, 41 ; 84 inch and over, 44 ; segment and pattern sheets, 41 ; and locomotive fire box sheets, 38, net cash. Ingot is in better demand, and with a reduced stock, and that in few and strong hands, prices are ¼a ¼ cent per pound higher ; the sales embrace 590,000 pounds lake, commencing at 28¼ cents and closing at 28½ for cash and early next month delivery, and 28⅞a28¾ from middle to latter part of march. Planished copper has advanced 2 cents per pound. The Ansonia Brass and Copper Company has advanced 2 cents per pound, making 14x48, 14a16 oz., and over 42, and 12 oz., 45 cents, and boiler sizes 14a16 oz., 14x48, 44 cents, 1 cent less by the case ; and 30x60, 14a16 oz and over 46, and 12 oz. 49, cash —planished brass two cents less than planished copper.

STEEL.—All descriptions are steady and firm at our quotations—the English market further advanced 10s. on common, and 20s. on best quality. There is a scarcity of saw plates, all to be had from 5 to 8 feet, here and to arrive, having been taken for making lightning cross cut saws.

SPELTER.—In the absence of business, prices are entirely nominal at 7a7¼ cents gold for Silesian.

TIN.—Pig remains quiet, though there has been a little more business ; prices are unchanged. The sales are 250 slabs straits at 36 cents ; and 100 do. Malacca. 36¼. Straits is generally held at 36a36¼ cents, English 35½a36, and Banca 41, all gold. After a little pause in Plates, an active demand has again set in, and, with large sales, prices have been further advanced 25a50 cents per box, gold. The sales are, including parcels to arrive, 5000 boxes charcoal tin at $10 70a$10 75 for I. C., now generally held at $11 ; 2750 do. charcoal terne, $9 37½a$9 75 ; 1000 do. I. C. Coke, 14 by 20, $9 65½ ; 750 do. B. C. coke terne, $8 25a$8 37½ ; 500 do. prime brand, $8 87½, all gold ; and 100 do. I. C. Coke, $10 87½, currency.

ZINC.—Sheet is quiet, and we have no transactions to

note, being quoted at say, 10½a11, Am. ox. 7a7½, French 9¼a9½, manganese 4a4½ cents.

METALS.

NEW YORK, Feb. 24, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1½ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton.

	Store Prices.
Pig, Scotch No. 1, ₩ ton	37 00@42 00
Pig, American, No. 1	42 00@45 00
Pig, American, No. 2	40 00@41 00
Pig, American, Forge	39 00@40 00
Bar Refined, English and American	— —@86 00
Bar Swedes, assorted sizes (gold)	$5 00@10 00
	Store Prices, Cash.
Bar, Swedes	115 00@125 00
Bar, Refined, ⅜ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	97 50@— —
Bar, Refined, 1¼ to 6 by ¼ & 5:16 & 2½ to 2⅞ rnd. sq.	102 50@— —
Bar, Refined, 1 & 1½ by ¼ & 5:16	105 00@— —
Large Rounds, 3½ and 3¾ inch	— —@107 50
Large Rounds, 3¾ and 4 inch	— —@112 50
Large Rounds, 4¼ and 4½-inch	— —@1.5 00
Large Rounds, 4¾ and 5-inch	— —@1.5 00
Scroll	115 00@145 00
Ovals and half-round	112 50@132 50
Band	— —@110 —
Horse Shoe	110 00@120 —
Rods, ⅜ to 3-16 inch	102 50@137 50
Hoop	117 50@165 00
Nail rod	7¼@— 00
Sheet, Russia, as to assortment (gold)	15@— —
Sheet, Single, D. and T. Common	—5½@— 6
Sheet, D. and T. Charcoal	—6½@— 7
Sheet, Galv'd, Nos. 10 to 27	10@13c lb.
" " Nos. 28, and 29	15@19c lb.
Rails, English (gold), ₩ ton	@6? 00
Rails, American, at Works in Pa	@73 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₩ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₩ lb	— @— 36
Copper Bolts	— @— 38
Copper Braziers, 16oz. and over	— @— 38
Copper Nails	— @— 42
Copper, Old Sheathing, &c. mixed lots	25½@— 26
Copper, Old, for chemical purposes, 14@16 oz	— @— —
Copper, American Ingot	28½@— 28½
Yellow Metal, New Sheathing & Bronze	— @— 26
Yellow Metal Bolts	26 @— —
Yellow Metal Nails	— @— 26

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb: Pipe and Sheet, 2¼ cents ₩ lb.

Galena, ₩ 100 lbs	$— @— —
Spanish (gold)	5 90 @6 00
German, do.	5 90 @6 00
English do.	5 95 @6 25
Bar (net)	9 25 @— —
Pipe (net)	— — @10 00
Sheet	— — @10 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ₩ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent. ad val. (Store prices.

English Cast (2d and 1st quality) ₩ lb	— 16 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11 @— 13
English German (2d and 1st quality)	— 10½@— 12
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery do.	— 9 @— 10
American German, do.	— 9 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Roofing 25. ad val.

	Gold ₩ lb.
Banca	— @41
Straits	36 @36¼
English	35½ @36

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ₩ box	$10 75 @11 00	$12 00 @12 25
I.C. Coke	9 75 @10 00	10 75 @11 25
Coke Terne	8 25 @ 9 00	9 50 @10 00
Charcoal Terne	9 50 @ 9 87½	10 50 @11 25

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb.	7 00 @ 7 75
Plates, Domestic p. lb.	— 7 @— 11

ZINC.—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c per lb

Sheet per lb.	— 10½@— 11

San Francisco Stock Market.

BY TELEGRAPH.

Our advices from the San Francisco Stock market are dated the 20th inst. Imperial and Yellow Jacket are the only exceptions to a slight decline of the list, the former named item is quoted at $117 per share, an advance of $3 compared with our last report. Raymond and Ely, by advices per associated Press of the 16th, is up to $133½, Ophir on the same date was quoted at $97½, and Alpha $31; the report is as follows.

	Feb. 20.	Feb.
Savage	230	—
Yellow Jacket	74	—
Kentuck	24½	—
Chollar Potosi	64	—
Gould & Curry	202	—
Belcher	620	—
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Imperial	117	—
Eureka C. V.	17½	—
Meadow Valley	—	—
Amador	—	—
Hale & Norcross	—	—

Mining Stocks.

With the exception of a slight decline in Lacrosse and a corresponding advance in Consolidated Gregory, the Gold Stock list is unchanged. The tendency of the market, however, is toward improvement; the total sales for the week are, 100 shares of Con. Gregory at 20, 1500 do. Lacrosse at 19 and 100 Smith and Parmlee at 16 cents The report of the board is as annexed.

	BID.	ASKED
American Flag	—	20
Bates & Baxter	25	—
Benton	—	—
Black Hawk	—	—
Central Gold	30	—
Cisco Gold	—	—
Cons Gregory	—	—
Grass Valley	18	—
Gunnell	3	—
Holman	8	—
La Crosse	—	—
Liberty	15	20
Mariposa prf	—	—
Rocky Mount	—	—
Quartz Hill	—	5
Smith & Parm	5	10

Petroleum is nominally unchanged, the transactions during the week have been exclusively confined to several transfers of Webster, aggregating 5000 shares at the uniform price of 2 cents per share; the quotations of the board are as follows.

	BID.	ASKED.
Bennehoff Run	20	—
Bergen Coal and Oil	—	—
Bliven Oil	—	—
Blood Farm	—	—
Brevoort	1 00	2 50
Buchanan Farm	35	—
Central	50	—
Clinton	—	—
Home	1 00	—
National	—	—
New York & Allegheny	1 25	—
Northern Light	30	—
Phillips Pet	5	15
Pithole Creek	20	—
Rathbone Oil	25	35
Rynd Farm	—	40
Second National	—	—
Sherman & B	—	—
Tarr Farm	—	—
United Petroleum Farms	25	—
United States	40	—
Webster	—	2 00

STEAM
PUMPING MACHINERY

INDEPENDENT
BOILER FEEDER.
Works Hot and Cold Water.

LARGE AND SPLENDID
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Sent Free on Application.

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KENRICK & COMPANY
MINING & RAILWAY CONTRACTORS, SINKERS, &c.
WILKES BARRE,
feb.20 t.f Penn.

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ANALYTICAL and CONSULTING CHEMIST
No. 18 EXCHANGE PLACE.
A few students will be received into the Laboratory for thorough practical instruction in Chemistry. dec11:1y

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209 South Sixth Street,
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Analyses of Ores, Coals, Smelting Products, etc. Examinations of Metallurgical Processes. Instruction in Analytical Chemistry. d5:6mo

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WILKESBARRE COAL,
MINED BY THE
Wilkesbarre Coal & Iron Co.
OFFICE:
NO. 80 BROADWAY
NEW YORK.
Orders received for
SHIPMENT BY RAIL
DIRECT FROM MINES,
OR FOR
RESHIPMENT FROM COMPANY'S WHARVES,
AT
Port Johnson and Hoboken, New Jersey.

DETMOLD & COX,
ANTHRACITE AND BITUMINOUS
COALS.
Office, 40 Trinity Building, New York. Jan 23:1y

CUMBERLAND COAL,
MINED BY THE
CONSOLIDATION COAL COMPANY,
Of the best quality for manufacturing, steam generating, and domestic purposes.
Orders received by the Cargo at
New York Office, 71 Broadway.
New England Agency,
STEVENSON & PIERSON,
48 Kilby street, Boston.
Baltimore and Georgetown Agency,
G. MEREDITH, South Gay street,
mch7:tf Baltimore.

THE NEWBURGH ORRIEL COAL COMPANY
Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
C. OLIVER O'DONNELL.....President.
CHAS. MACKALL.....Secretary
This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.
The best dry coals shipped, and the promptest attention given to orders. sep21-1y

LEWIS AUDENRIED & CO., MINERS AND SHIPPERS of the following celebrated
ANTHRACITE COALS.
From Philadelphia and the Mines,
DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash; Old Company's Lehigh; Wilkesbarre.
From Port Johnston and Jersey City,
Old Co.'s Lehigh, Hazleton, Wilkesbarre, and Shenandoah Coals.
Also the superior CUMBERLAND COALS.

BROAD TOP,	BARTON,	BARTON,
SEMI-BITUMINOUS,	GEORGES CREEK,	GEORGES CREEK,
at Philadelphia.	at Baltimore.	at Alexandria.

205 Walnut street, Philadelphia; 14 Kilby street, Boston, 34 Westminster st., Providence; 24 Second st., Baltimore,
110 BROADWAY, NEW YORK. Jan3.1y

THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
Wharves, Locust Point, } Baltimore.
Company's Office, No. 29 South st. }
AGENTS:
PARMELEE BROTHERS, No. 32 Pine street, New York. BANGS & HORTON, No. 31 Doane street, Boston.
Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.
☞ Reference to them is requested. may30-1y

COXE BRO.'S & CO., CROSS CREEK COLLIERY, MINERS and Shippers of the Celebrated
Cross Creek Free Burning Lehigh Red Ash
COAL.
FROM THE BUCK MOUNTAIN VEIN.
OFFICES:
Philadelphia, No. 341 Walnut street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr.,
Room 43, Trinity Building,
feb-1 111 Broadway.

SAMUEL BONNELL, JR., OFFERS FOR SALE HIS SUGAR CREEK and HONEY BROOK
LEHIGH COALS.
OFFICE:
Room 45 TRINITY BUILDING, 111 BROADWAY,
NEW YORK. Jan:1y

MARYLAND COAL CO.,
Miners and Shippers of the best George's Creek Cumberland Coal.
Office No. 12 Trinity Building.
W. W. BRAMHALL, Secretary & Treasurer.
A. CHAMBERLIN, President.
jan23:1y JOHN K. SHAW, Vice President.

G. B. LINDERMAN & CO.,
MINERS,
Sugar Loaf, Lehigh Coal.
OFFICE, 50 TRINITY BUILDING, 111 BROADWAY
may23-1y NEW YORK.

New Central Coal Company
OF MARYLAND.
GEORGE'S CREEK CUMBERLAND COAL
OF THE BEST QUALITY.
Delivered on board at Baltimore or Georgetown, or from the Company's wharves at Hoboken.
Orders received by
HARRY CONRAD,
President.
No. 6 and 6½ Trinity Building. jan23

DEPARTMENT OF POPULAR SCIENCE.

The Birth of an Iceberg.

When fresh ice floats freely in sea-water, there is one-eighth of it above the surface to seven-eighths below. If these proportions become disturbed—that is to say, if the glacier should project far enough out into the sea and deep water to present more than seven-eighths below to one-eighth above, then the buoyancy of the water will lift the end of the ice-stream until it attains its natural equilibrium. To do this, of course, a break must occur, as the ice will not bend. But for a long time the continuity of the ice is not interrupted—so great is its depth (many hundreds of feet), so great is its width (two miles). But, finally, it is compelled to give way; the force applied becomes too great for its powers of resistance. A crack, beginning at the bottom, is opened with a fearful crash. The crack widens; and when it is completed to the top a fragment is detached. * * * The accompanying vertical section of the glacier of Sermitsialik (Greenland), run up its axis from the fiord to its junction with the *mer de glace*, a distance of ten miles, will illustrate the fact. * * This vertical section shows an iceberg just broken off and floating away. * * *

I can imagine no more grand and imposing spectacle than the birth of an iceberg; and we have now, I think, gone far enough in the examination of glaciers and their movements to contemplate such a spectacle, which, whatever it may seem to the reader, was to me most thrilling. * * The scene was in a fiord ten times wider than that of Sermitsialik, though not much longer. Unlike that of Sermitsialik, it was studded with islands and shoal places.

The glacier which terminated it was twenty miles across, although not quite uniformly; for the ice had poured down into the sea, and, while having blotted out some of the islands, it had barely touched others; otherwise the coast-line of ice was perfect and continuous. The islands and shoal places in the fiord arrest the icebergs; and within ten miles or more of the glacier it is almost impossible to go. With great difficulty I came within five, in a boat. Farther I could not force my way by any possibility; and, accordingly, we made the land and climbed a lofty hill for a view.

The fiord which I thus describe is known as the fiord of Aukpadlartok, a native word, signifying "the place of the red rocks." I had gone up the fiord from Upernavik to the hut of a hunter, who was the *bestyrere* [governor] of a small settlement of that name, belonging to the Upernavik district.

It was a grand spectacle that met my eye as I stood upon the hill-top overlooking the fiord, with its thousands of icebergs, its dark, rocky islands, and the immense quantity of loose ice which filled up the space between the bergs and islands, until there was scarcely a patch of water to be seen anywhere as large as a good-sized duck-pond. Very different from the fiord of Sermitsialik, where there were no islands nor shoals to arrest the ice in its progress down the fiord.

I was accompanied by the *bestyrere* of Aukpadlartok, whose name was Philip. We stood together looking at the glacier and the great sea of ice which stretched away into the interior, blending mountains and valleys into a vast plain, when Philip said, "Listen! the glacier is going to 'calve;'" for that is the name by which they distinguish the breaking off of a fragment.

I heard a loud report, but I could not at once distinguish the source of it. An instant afterward it was repeated, louder than before. It resembled the first warning sound of a coming earthquake. Philip had detected the spot whence the sound proceeded, and said, "Look! it is rising." I could now see that a portion of the glacier was being lifted by the water. A great wave was rolled back with this upward movement and dashed fiercely against the icebergs that lay further down the fiord. Another instant, and the sound, which was before so deep and loud, broke through the air with a crash that was like the discharge of heavy artillery near at hand. I knew now that a crack had opened in the ice-stream and that a mass had been disengaged.

The position of the crack was quickly apparent, and we could see that a fragment of enormous proportions had been set at liberty. It first reared itself aloft as if it were some huge leviathan of the deep indued with life, and was sporting its unwieldy bulk in the hitherto undisturbed waters. The crack had now opened wide. The detached fragment plunged forward, the front, which had been rising, then sunk down, while the inner side rose up, and volumes of water that had been lifted with the sudden motion poured from its sides, hissing, into the foaming and agitated sea. Thus an iceberg had been born.

It would be impossible with mere words alone to convey any adequate idea of the action of this new-born child of the Arctic frosts. Think of a solid lump of ice, a third of a mile deep, and more than half a mile in lateral diameter, hurled like a mere toy away into the water and set to rolling to and fro by the impetus of the act—as if it were nature's merest foot-ball—now on one side, until the huge bulk was nearly capsized; then back again; then down the other side once more, with the same resistless force; and so on, up and down, and down and up, swashing to and fro for hours before it comes finally to rest. Picture this, and you will have an image of power not to be seen by the action of any other forces upon the earth.

The disturbance of the water was inconceivably fine. Waves of enormous magnitude now rolled up with great violence against the glacier, covering it with spray; and billows came tearing down the fiord, their progress marked by the crackling and crumbling ice, which was everywhere in a state of wildest agitation for the space of several miles. Over the smaller icebergs the water broke completely, as if a tempest were pulling up the seas and heaving them fiercely against the shore. Then, to add still further to the commotion thus occasioned, the great wallowing iceberg, which was the cause of it all, was dropping fragments from its sides with each oscillation, the reports of the rupture reaching the ear above the general din and clamor. Other bergs were set in motion by the waves, and these also dropped pieces from their sides; and at last, as if it were the grand *finale* of the piece—the clash of cymbals and the big brass-drum of Nature's grand orchestra—a monstrous berg near the middle of the fiord split in two, and, above the sound of breaking waters and falling ice, this last disruption filled the air with a peal that rang among the bergs and crags, and, echoing from hill to hill, died away only in the void beyond the mountain tops; while to the noisy tune the ice-bergs of the fiord danced their wild, ungainly dance upon the waters.—*Dr. Isaac J. Hayes, in "The Land of Desolation."*

Progressive Instruction in Chemistry.

NOT long since, we spoke of the desirability of really experimental instruction in physics, that is, progressive teaching, accompanied throughout by laboratory practice on the part of the student, and serving in fact as a guide merely, while the student himself becomes familiar with the facts by his own inquiries and manipulations. In this connection, we referred with praise to the excellent new manual of the elements of physics, prepared on the plan we have indicated by Professor G. HINRICHS of Iowa University. What that book was designed to do for the practical study of physics, the "Elements of Chemistry," by the same author, attempts for the study of chemistry.

In one sense, the latter work is equally successful with the former; it manifests the same excellent qualities of logical arrangement and succession, suppression of abstract theories, perpetual stimulation of the student to independent activity, and subordination of everything to the great object of training the mind, eye and hand in the methods of scientific research. But laboratory practice in chemistry is not, like laboratory practice in physics, a new thing. The necessity of teaching chemistry in that way has always been recognized; and our chemical text-books have been more or less affected by it. Professor HINRICHS could not make his chemistry as novel in method as his physics, hence it may not attract so much attention, or serve so pressing a need. Yet a sketch of its contents will show that the very original and ingenious mind of the author has not been reduced to the necessity of following in the beaten track—that, like all his works, this one has the merit of being his own, and not a mere compilation or reiteration of the works of his predecessors.

The full title of the book is "The Elements of Chemistry and Mineralogy, Demonstrated by the Student's Own Experiments." It is intended for progressive instruction, not for reference; and hence it does not contain a complete review of the facts of chemistry, but rather an explanation of the manner in which those facts are to be investigated and verified. There is a notable absence of chemical formulae in the body of the book; and no hypotheses of modern origin are dogmatically propounded, except such as may be regarded as definitely established like the mechanical theory of heat. We must make exception to this statement in the case of the classification of the elements in "*genera*," the names of which indicate that they are derived from Prof. HINRICHS' "Atomechanics," though he does not obtrude that theory in any other way that we have noticed, in the book. This peculiar classification slightly infects the chapter on Descriptive Mineralogy—a circumstance which is to be regretted, if it hinders the use of the book by those who prefer to adhere to existing systems. As a matter of fact it does no harm to arrange substances as Kaloids, Calcoids, Phosphoids, and the like, particularly if the arrangement brings together such as have similar physical properties or chemical reactions (which is partially true in this case); but it may lead to the over-hasty rejection of a book, in which this peculiarity is not essential nor prominent, and of which the general method is both new and good.

We must notice three characteristics of Professor HINRICHS, which are quite clearly illustrated in this volume. The first is the ingenuity with which he employs simple and home-made apparatus for the many purposes of experimental training. The second is his clever and frequent use of graphic methods, as opposed to tabular. A stricking sample of this is the chart of descriptive mineralogy, in which the numerical values of hardness and specific gravity are co-ordinates, determining the position of a point which represents the mineral species sought. We have long used tables prepared by ourselves, in which a similar method of determining minerals is followed; and we know that this choice of hardness and gravity as distinguishing marks, though arbitrary, is perfectly convenient. Of course it brings strange neighbors together—species which have little else in common than these qualities; but for identifying minerals it is quite efficient, as is the Linnean system in botany. To Professor HINRICHS belongs the credit of putting it in the shape of a diagram, which is surprisingly superior to a table in the compactness of its contents, and the rapidity with which it can be read in practice.

But we have only space to mention a third characteristic of the author, as shown in his book. We refer to his evident love of neatness, order and system in laboratory work. If Professor HINRICHS were far less eminent than he is as an original contributor to science, it would be a valuable discipline for students to receive such a thorough training in these respects as his temperament qualifies him to give. "The School Laboratory of Physical Science" contains specimens of the work done in experimenting, observing and recording, by the pupils under this system; and it must be confessed that the showing is highly creditable. Of course the fruits of the system cannot be looked for all at once, but we do not doubt they will ultimately be felt in the development of a generation of truly careful and precise chemists.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
WILLARD P. WARD, M. E.
Editors.

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Missouri Tin.

A COMMUNICATION on this subject appeared in our number of Jan. 23, with regard to which our editorial position has been misunderstood. We need hardly repeat that we do not endorse the opinions of our correspondents; and in this matter of Missouri tin, concerning which we have had, from time to time, a good deal to say, our own view is well known. We have recorded the evidence, *pro* and *con*, as to the existence of tin in workable quantity in that State, and while our judgment upon all the attainable facts thus far is unfavorable to the mining schemes based upon alleged discoveries of such deposits, we are still ready, as we have always been, to publish statements from respectable sources on the other side. Such a statement is now promised us by the Missouri Tin Company, and we shall be glad to lay it before our readers.

The history of these enterprises (for we believe there have been several of them) is curiously mixed. The results of samples brought East for assay have been, in every well-authenticated case within our knowledge, highly unfavorable.

In some cases, the circumstances surrounding favorable assays have been suspicious, to say the least. And the opinion of our best experts is decidedly discouraging to tin-mining in Missouri, though the bare existence of tin in some of the rocks there is admitted. On the other hand, we do not doubt that highly respectable capitalists of St. Louis and other places have honestly invested their own money in such enterprises, and have carried on experiments at great cost. Such men, acting upon their own opinions, may be deceived by swindlers, or they may be deceived by the appearances of facts, or they may not be deceived at all, but come out triumphant in the end over all the wise warnings of cautious experts. In any case, we do not mean to cast suspicion upon them, merely because they choose to pursue undertakings which we deem mistaken; and so far as the communication alluded to accuses *bona fide* mining operators of willful fraud, we regret its publication. It is high time, however, that such persons should make up their minds whether they have been right or wrong in their expectations; and if they have been right, it becomes us, as well as the whole scientific press and public of the country, to acknowledge the truth as soon as it is made manifest. Just now, it is *not* manifest.

Editorial Correspondence.

THE MEETING OF THE INSTITUTE.

PHILADELPHIA, February 21, 1872.

As you will see by the report of the first session of the Institute, this meeting is not likely to fall behind any of its predecessors in interest and importance. The attendance is large, the hall of meeting last night being completely filled. The subjects of discussion are vital, and the eagerness with which they are taken up shows that the members and associates are in earnest. As one of them remarked this morning, "I don't see where this thing is going to end. Every meeting is better than the last."

At the session to-night we expect a great treat in the papers of HOLLEY, DROWN, LYMAN and PEARSE. But I will not discount it to you in advance. Next week you shall hear in full detail. R. W. R.

American Institute of Mining Engineers.

FOURTH QUARTERLY MEETING.

The February meeting of the Institute commenced on Tuesday evening, the 20th inst., at Philadelphia, in the building of the University of Pennsylvania. In the absence of President THOMAS, Vice-President RAYMOND, and subsequently Vice-President COXE, occupied the chair. The Institute was welcomed in an eloquent and thoughtful address by Prof. J. P. LESLEY (see full report elsewhere in our columns) to which the presiding officer briefly responded. Invitations were announced from the proprietors of SELLER'S Tool Manufactory, WHITNEY'S Car-wheel Works, the BALDWIN Locomotive Works, BUTCHER'S Steel Works, LEWIS & BROTHERS' White Lead Works, the Southwark Foundry, HARRISON'S Boiler Manufactory, the University of Pennsylvania, and the Academy of Sciences.

The following gentlemen, being duly recommended by the Council as members and associates, were unanimously elected.

(*a*) Col. Chas. Scranton, Oxford, N. J.
(*m*) Edward Canfield, Dover, N. J.
(*m*) Dr. J. P. Kimball, New York City.
(*m*) W. S. Keyes, Eureka, Nevada.
(*a*) T. B. Brooks, Marquette, Mich.
(*m*) E. M. Grant, Tuskegee, Ala.
(*a*) Daniel Edwards, Danville, Pa.
(*a*) Charles Law, Pittston, Pa.
(*a*) David P. Brown, Pottsville, Pa.
(*a*) Hugo Sontag, St. Louis, Mo.
(*m*) J. Blodgett Britton, Philadelphia, Pa.
(*m*) John D. Esterbrook, Germantown, Pa.
(*m*) John B. Pearse, Baldwin Station, Pa,
(*m*) Joseph Wharton, Philadelphia.
(*a*) A. W. Humphreys, New York City.
(*a*) John S. Alexander, Philadelphia, Pa.
(*m*) Charles Gignoux, New York City.
(*a*) Wm. A. Ingham, Philadelphia, Pa.
(*m*) H. B. Cornwall, New York City.
(*m*) Pierre Ricketts, New York City.
(*m*) Thomas C. Steele, Summit, Pa.
(*m*) Wm. B. Cogswell, Franklin Iron Works, N. Y.
(*m*) W. Firmstone, Glendon, Pa.

The first paper was read by Mr. ROTHWELL, on Tests of the Efficiency of Ventilators. (It will hereafter be published in our columns in full.) The paper described the method employed to test the efficiency, particularly of fans, by measuring the indicated power of steam-cylinder (less 25 to 30 per cent. for loss in the engine), and the quantity, velocity and drag of air. The tests have shown that the fans used in the Wyoming Valley are not highly efficient, though they deliver a good deal of air—sometimes as much as 110,000 or 120,000 cubic feet per minute. But the large air-ways lessen the drag, so that it seldom or never exceeds 1½ to 1¾ inches water-gauge, or 7 to 9 lbs. per square inch. In some collieries, ten minutes' stoppage of the fan would make it impossible for the miners to work. The Wyoming fans are all exhaustors, and the Guibal is the best. But this fan shows everywhere in its interior a slight pressure of air. Mr. WHITING has made an experimental fan, in which the curve of the case widens, like the involute of a circle, and the diameter of the chimney is likewise increased upwards. The blades have a circular backward curve, terminating in a flattened curve, until at the extremities they are tangential to the case. By continuing the blades to a length experimentally determined, the pressure in the fan was reduced to an equality with atmospheric pressure, so that no outward draught can be observed through holes bored in the side.

Mr. COXE observed that in that case the partition or casing might be taken off, leaving the fan to discharge without a chimney, like an inverted turbine; but Mr. ROTHWELL replied that this had been tried, but would not work.

Mr. DADDOW said that increase of drag is not desirable, 7 to 8 lbs. being the best proportion. If more was required, he obtained it by the use of propeller fans outside of the exhaustor, by which he could get 10 to 15 lbs. He had not measured the absolute efficiency of this arrangement, but found it to do double the work of the ordinary fan.

Mr. ROTHWELL said the Guibal fan would easily take 10 to 15 lbs. drag, and that there was no need of adding propellers outside to do as much as that.

The next paper was by Professor MAYNARD, on the Adaptability of Titaniferous Ores for the Production of Iron by Known Methods. (This will be published in full next week.) After reviewing at length the literature of the subject, Prof. MAYNARD said the following conclusions appeared probable:

1st. That titaniferous ores may be used with advantage in the blast furnace in small quantities with other very fusible ores.

2d. They will probably act well as a fettling in puddling furnaces.

3d. They do not appear to be adapted for the production of iron by any of the known direct methods. No direct method, except the Catalan and American forges with very pure ores, has proven a commercial success. The ores used in the experiments described contained titanic acid in quantities ranging from 11.50 to 16.37 per cent, and were obtained from Lake Champlain. Two recent attempts were mentioned—one at the Albany furnaces, which was unsuccessful, and one at the Stockbridge furnaces, which was reported satisfactory, and still in progress.

Prof. LESLEY said there is a vein of titanic iron

ore, back of Phœnixville (the old ALLEN mine) containing 16 to 17 per cent. of titanium, and very refractory. Yet the furnaces on the Schuylkill, years ago (and perhaps still) valued it highly, mixing 10 per cent. of it with other ores, to improve the product. There is very little known of the exact effect of titanium. GENTH has found chrome in the titanic ores of North Carolina (Greensboro'), which perhaps produces the effect. As Prof. MAYNARD had shown, according to some analyses, the titanium does not go into the product and combine with the iron at all. But such determinations and inquiries are still full of uncertainty.

Prof. EGLESTON observed that titanic ores are usually classed as "refractory;" but this is not strictly true. The ores containing, say 15 per cent. of titanium are generally mixtures or solutions of ilmenite in magnetite. In the furnace, the titanium probably acts as does manganese—the whole of the titanic acid passing into the slag, and removing impurities of the ore, yet leaving the slag fusible. For this a higher temperature may be required.

Mr. COXE inquired how far the increased temperature of the blast might of itself assist in removing impurities.

Prof. EGLESTON—Such an increase has its limits. The higher temperature first enlarges the reducing zone and augments the quantity of iron reduced; but if carried too far, the zone is made too high, and black cinder is the result. The titaniferous slags are not found to contain more iron than others. The Berkshire district (in which the Stockbridge furnaces are) has a great variety of ores and slags, which may explain differences of experiments. Possibly titanium may be advantageous with a particular kind of cinder.

Mr. RAYMOND mentioned the vagueness with which different qualities were attributed to small traces of ingredients in iron and steel, and thought this was frequently done for commercial reasons, to bring particular brands into notice.

Prof. LESLEY said people could hardly be blamed when we recollect that ½ per cent. of carbon does make so great a difference in the physical properties of iron. The spectroscope ought to be able to tell positively if there is no titanium in titanic iron or steel. Concerning the refractory character of titaniferous ores, he thought it due to the presence of magnetite, and mentioned instances in which titaniferous ores were as loose as hematites. The meeting then adjourned till the following evening.

The daylight hours of Wednesday were spent by the members and associates in visiting under the efficient guidance of the Local Committee, the various manufacturing and metallurgical works for which Philadelphia is justly celebrated. At the session in the evening, papers of great interest were presented, for several of which the aid of the fine magic lantern of the Franklin Institute was employed, to throw large diagrams and illustrations upon the screen, which served the purpose, on this occasion, of the blackboard, vigorously used by several speakers, the evening before. We shall conclude our report of the meetings next week, and commence the publication in full of the papers presented.

Danks' Rotary Puddling Furnace.

THE report of the English committee who visited this country to examine into the merits of the Danks' furnace was briefly alluded to in our columns last week. We now present a short abstract of the document, regretting that the crowded state of our columns prevents us from making a much more detailed one.

The committee, consisting of Messrs. SNELUS, JONES and LESTER, spent three months in their investigation, in the course of which they witnessed the practical working of the process at Cincinnati, Pittsburg, Indianapolis and Chattanooga. The report is issued without waiting for a number of analyses which are being made of selected samples. When these are completed, it is hoped that each member of the commission will issue an individual report treating fully of the scientific, commercial and practical aspects of the subject.

It will be remembered by our readers that when the committee left England they took with them 40 tons of English pig iron, of well known varieties, and also sufficient quantities of several ores to test their availability as fettling material.

The first portion of the report is devoted to a description of the furnace, the tools employed, etc. As the general plan of the furnace is, doubtless, well known to our readers, and as we have not at our disposal, at the present time, the cuts which would be necessary to illustrate a detailed description, we shall pass over this portion of the report.

The next part is devoted to the mode of fettling the furnace, full particulars of the materials employed, how long the fettling stands in the furnace, etc., in which the figures are given in tabular form. It appears that during a whole week's run there were employed 15,392 pounds of ore of various kinds; 12,138 pounds of squeezer and roll cinder; 730 pounds of scrap iron; 41,508 pounds of coal, and 27,010 pounds of pig iron, and there were produced 28,890 pounds of puddled bar and 7,446 pounds of tap cinder.

The amount of coal used to the ton of puddled bars, derived from a week's work in two furnaces, was 29 cwt.

The amount of repairs done to the nine furnaces of the Cincinnati Railway Iron Works during the week ending November 11, 1871, were exceedingly small, and are given in a separate table. The report says that from three weeks' observation they judge that the repairs on furnaces of this kind will be small. The repairs of brickwork, in comparison with ordinary puddling furnaces, are said to be very small indeed.

With regard to the quality of the iron produced, we are aware that this is a most important part of our inquiry, and we have, therefore, undertaken to bring back to England samples of iron produced at each stage of the process—from a bloom, weighing between 600 and 700 lbs., down to wire rods and other finished iron—as well as samples of the intermediate stages. You will thus have the opportunity of testing the various irons, and forming your own conclusions thereon. With regard to the impression made upon the minds of the Commissioners, we beg to say that we are satisfied, on the whole, that the quality of the iron produced is materially improved by this process. On fracturing the squeezed bloom, we found it presented an open, spongy mass, as though it had not received sufficient compression, and also presenting tokens of the presence of a quantity of cinder. There can be no doubt that this is the case. On the bloom, however, being reheated and rolled into a bar, it parts freely with its cinder, and in the fracture of the bar we were not able to detect the presence of more of it than is found in any other puddled bar. The bar in fracture presented the appearance of that of an ordinary puddled bar. In the various blooms which we fractured, we searched for pieces of unreduced fettling, and we discovered several pieces in one bloom, but only in one. The others seemed in the fracture to be free from it. We had anticipated that this ugly fracture would have presented itself more freely, but we are compelled to admit that in the subsequent working of the iron it did not bear out our anticipations. It is our duty to remark here that all the machinery for squeezing and rolling at the Cincinnati Works was too weak to deal effectively with such a heavy mass of iron as 600 pounds in weight. The size of the train is 18 in., and it certainly would not have taken a hammered bloom of 12 in. diameter without risk of breakage. In order to meet this contingency, the squeezer but partially did its duty; and to the rolls, after a reheat of the blooms, was delegated the work of removing a large portion of the cinder. The gear attached to the squeezer was also light, and that tool had also to be humored. With stronger squeezing and rolling machinery, no doubt the cinder can be more effectively removed on its first manipulation after coming from the puddling furnace; but we do not expect that the sponginess in the bloom, to which we have before alluded, will have disappeared by that improvement. It may be necessary, in order to get a close and compact fracture in the bloom, to resort to hammering; but, on this point, we cannot at present offer any decided opinion. It may be, and it is probable, that the sponginess of which we have spoken is no detriment to the quality of the iron, after having been worked in the subsequent processes. Whether the reheating from the squeezer will be found to be indispensable, is a matter we cannot well determine now. On rolling off a few pieces, the result was not satisfactory. It may have been due, and probably was, to the somewhat imperfect manner in which the bloom had been squeezed.

"Looking at the furnaces at work," the Commission was "requested to report particulars as to the per-centage that are kept in regular operation each shift, with the view of affording data for estimating the amount of work to be expected from a whole forge fitted up on Danks's system," and they refer to statement No. 10, from which it will be seen that of nine furnaces which were lit for work, eight worked more or less continuously throughout the week.

"Particulars as to the number of men employed in connection with each furnace and with squeezer; class of workmen, whether ordinary ironworkers or mechanics," were points on which the Commission was requested to obtain information, and they say, "There are two men who directly control the working of the furnace, viz., a forehand and underhand. There is, secondly, a laborer between two furnaces, whose duty it is to take away the slag, to assist in charging the furnace, and to work the crane in the manipulation of the tools. Thirdly, there are two men who run the balls from the furnaces to the squeezer by means of the fork and way, as before described. These two men also remove the bloom from the squeezer, lift, and deposit it on the charging fork for the re-heating furnace. An additional laborer works the horizontal hammer. About one-half of the men, at the rotary furnaces, were old puddlers—the other half were young men, who had had nothing whatever to do with puddling. One of them, a fitter, was the best puddler at the works."

The "Royalty paid per ton in America," so far as the Commission could ascertain, is 1 del. per ton of puddled bar.

"As to the number of works where the apparatus is in operation, the number of furnaces at each place; opinions of American practical men on the machine; details of classes of finished iron for which the machine-made puddled iron is used; whether used alone, or mixed with scrap or old rails, when being converted into finished iron," the Commission report: "At the Cincinnati Railway Ironworks there are *nine* rotary puddling furnaces erected, and one in course of erection. Eight furnaces are kept in constant work, and one used as a reserve; so that, should a breakage occur, the men can be transferred to the idle furnace. There are no other puddling furnaces in the forge. At the Roane Ironworks, Chattanooga, Tennessee, *nine* furnaces are erected; seven were at work during our visit. Both the above works have the Winslow squeezer, with Danks's improvements. At the Indianapolis Rolling Mills, Indiana, two furnaces were completed and "initial" lined, two others nearly completed, and six more in course of preparation. A Winslow squeezer was nearly finished. JONES, LAUGHLIN & Co., at Pittsburgh, have one furnace, which they worked for about three months (up to the hot weather of last summer), making iron for small sections, but, having no squeezer, the results were not altogether satisfactory to them. The yields were good, as will be seen from the annexed statement, No. 11, which they kindly allowed us to copy from their books. Mr. JONES expressed the opinion that, with the squeezer, the results would have been improved. We had seve-

ral heats worked in the machine, and treated under the hammer, but it was quite evident that the appliances under their command did not enable them to deal with a large ball in a satisfactory manner. For details of the heats we saw worked, see statement No. 11. At the Fort Pitt Foundry, Pittsburgh, which we visited, they were making the castings for ten furnaces and a squeezer for GRAFF, BENNETT & Co., who, we understand, were guided in their decision by the recommendation of JONES, LAUGHLIN & Co. At New Albany, near Louisville, one furnace was at work for a short period, but the works were burnt down some time ago, and, although rebuilt, the rotary furnace has not been put in operation again. We found the general opinion of American practical men upon the subject to be that the machine was a success. Some few modified their statement by stating that they "thought it would do very well for rails, but would not make sufficiently clean and regular iron for small sections." The evident reason for this caution, on their part, is to be found in the following statement: The only class of finished product for which the machine-made puddled iron has been used, at works where the complete apparatus is erected, is *rails*. That the machine is quite capable of making good iron for other purposes is evident from the results of our experiments at the Globe Works, Cincinnati, where English and Welsh iron was rolled into various small sections, plates, and sheets. The machine-puddled iron is generally piled with old rails, but, in our experiments, very good rails were made from piles of puddled bars alone. A few rails were subsequently made from Welsh white iron (crystal and bar pig), with No. 2 iron for head and flange, and puddled bar for the middle of the pile."

"Particulars as to the production of steel blooms in the rotary furnace," are also given as follows:—"Three puddled steel blooms were made. Two of these were rolled into rails, which, on fracture, exhibited fine crystalline heads, but the flange, in each case, was finely fibrous. The third was hammered and broken, but did not show a good steel fracture. The attempt to make puddled steel was not very satisfactory; but this is, no doubt, to be attributed to the fact of the men not being accustomed to work puddled steel."

The Commissioners further report that they do not think the squeezer is an essential feature in the working of machine-made iron. If a means can be devised for the handling of such a heavy mass of iron as a ball weighing from 600 to 1,000 lbs. under a steam hammer, and getting it worked in reasonable time, it will do, probably, so far as equality of the iron is concerned, somewhat better than the squeezer; but, obviously, the squeezer is a handy, expeditious, and simple tool by which to manipulate the ball.

"The commercial aspects of the matter under inquiry have received careful attention," and the Commissioners say:—"We are of opinion that we have collected facts sufficiently to enable the Committee to form a decided opinion upon the commercial bearings of this invention. With coal, fettling, and repairs given, and yield of puddled bar from pig, and quantity turned out, in a given time, it will not be difficult for any one engaged in the manufacture of iron to determine the bearings of this matter. The machines we experimented on are in an early stage of the rotary process of puddling, and immense strides can rapidly be made in developing the process, which strides will materially affect the commercial bearings of the matter as it now stands. At present, we are agreed that the rotary furnace, as it now is, offers advantages commercially over the old process. If necessary, a further report will be provided by the members of the Commission separately, on the chemical, commercial, and practical aspects of rotary puddling.

"Samples of the American pig iron and fettling materials used have been brought away."

The Committee have arranged with Mr. Danks that the royalty to be paid in Great Britain shall not exceed 2s. per ton on machine-made puddled iron.

Important Decision Regarding the Mine-Ventilation Law.

THE following is an abstract of a decision of Judge G. M. HARDING, of Wilkesbarre, Pa., in the case of the Wilkesbarre and Seneca Lake Coal Company:

The present case has about it a phase altogether new; and hence a statement embracing its peculiarly distinguishing features must precede necessarily its further considerations understandingly. Detached from the trammels imposed by the language of the bill, and stated rather as the drafts of the premises, the affidavits produced before us, and the arguments and admissions of counsel presenting it, the case discloses substantially the following features: The defendants are the lessees and occupiers of a field of coal which, at the point where the mining operations are carried on, is oval in its shape; or which, at least, does not lie in a horizontal plane. A slope has been driven from the surface downwards, following the pitch of the seam or *stratum* of coal to a very considerable depth; and at the foot of it the coal has been exhausted to the extent of about forty acres. The area thus created is denominated, in the language of the bill, "old workings of a vein called the Hillman vein." In communication with this area, or these "workings," there are several distinct outlets, which extend therefrom to the surface, such as air-ways, and air-shafts, and which are separated—at least some of them—from the main slope at their respective places of exit on the surface, for a distance exceeding "one hundred and fifty feet," thus affording always convenient and ready means of ingress and egress available to persons employed therein.

So far, then, as these "old workings" constitute the mine or colliery of the defendants, there is, and has been hitherto, even more than a compliance with the provisions of the third section of the act of 3d March, 1870. By the terms of that section, "two outlets" are enjoined: here there are six. Clearly, therefore, the mine thus far is not within the legislative inhibition. The sudden, and even total destruction by fire, or otherwise, of the elaborate erections pertaining to the colliery, such as the engine-house, the breaker, the hoisting gearing, with all its complicated and heavy machinery, would not entomb the persons employed in the mine. Indeed, considering the multiplied avenues of exit, if the main slope should be utterly closed up with burning timbers and masses of detached rock, slate, or coal, the miners and other persons employed below could scarcely be endangered at all.

The complaint of the mine inspector and plaintiff in this bill is not, however, in any sense aimed at the mine or colliery of the defendants, so far as the same is constituted by the "old workings" in the "Hillman vein." On the contrary, it is levelled in earnest at what is alleged to be a most dangerous mischief in connection with this colliery, but which is deeper down in the earth by several hundred feet than the old workings of the Hillman vein.

The act of 3d March, 1870, has about it nothing which offers to the mind even a single doubt as to the legislative intent. Its very title—An Act providing for the health and safety of persons employed in coal mines—is suggestive of mischiefs which are to be remedied; its terms embrace a catalogue of these very mischiefs by name. And not only this, but the proper means are mentioned, and are enjoined upon the owners, lessees, or occupiers of mines, whereby such mischiefs may be avoided. Maps of mines are to be prepared and kept, so that in case of the abandonment of any mine, either in whole or in part, the dangers incident to the falling of the surface may be escaped; two outlets to every seam of coal worked by a shaft or slope are to be provided, distant from each other at least one hundred and fifty feet, so that any destruction of one, either by the burning up of the hoisting gearing and other necessary erections at the surface, or the closing thereof by falls of overhanging or adjacent slate, coal, or rock, may not jeopardize the lives of the persons employed therein; suitable ventilation must be secured and kept up in every mine, in order that it may be always free from noxious, poisonous, inflammable, and explosive gases; where such gases exist, and cannot be expelled by a single current of air, the mine must be divided into districts, carefully separated from each other, and each must be ventilated by a distinct current of air; and when any mining operations approach abandoned workings wherein inflammable gases or accumulations of water are suspected, boreholes must be driven at least twenty feet in advance, so that the dangers consequent upon these accumulations, such as fire from the one and inundation from the other, may not be encountered.

Recurring now to the mine or colliery of the defendants, who will say that it is not within the scope and spirit of the act? or who, that it presents a *casus omissus?* Adjudging, as we have already, that the mining operations are carried on in entire conformity with the statute, down to the point where the new lift commences, namely, the old workings in the Hillman vein, still, following on from this new lift, does not the slope continue in a seam of coal for a distance of three hundred feet and upwards, which is not in communication with a second outlet separated from said slope by "natural *strata* of not less than one hundred and fifty feet in breadth?" Thus operated and worked by the defendants, who employ a large number of persons in mining coal down at the bottom of this slope, can it yet be confidently urged that the mine is not under the ban of the statute? But it is even intimated, that being in a seam of coal which is in communication with two or more outlets, the mine is operated according to law. This is too technical by far. Very true, the seam of coal at the point where the old workings are, communicates with six different outlets, and is the same penetrated by and worked at the bottom of the slope, but *down there this communication does not extend.* The six outlets from the "Hillman vein" do not communicate with the mining operations at the bottom of the slope by any second outlet "separated by natural *strata* of at least one hundred and fifty feet in breadth;" on the contrary, the extent of the communication is the slope itself and the passage-way or air-way hereinbefore described.

We have in hand, then, a mine projected down into the very home of poisonous inflammable and explosive gases, and connected with it, there is no second outlet as required by law. At the bottom of this mine large numbers of men are daily "engaged in mining, raising, and shipping coal for market." A fall of slate, or of coal, or of rock, occasioned by a faulty roof, or by an explosion of gases, might at any moment as effectually close up the only means of egress—namely, the slope and air-way, as did the burning timbers at Avondale and at West Pittston.

And now, to wit, February 12, 1872, after due consideration of the complainant's bill, and after hearing the arguments of counsel on the one side and on the other, it is ordered that an injunction issue in conformity with the prayer of the bill, restraining the defendants from operating their mine or colliery in connection with the new lift, or continued slope aforesaid, until the further order of the court.

GARRICK M. HARDING,
President Judge.

MINING SUMMARY.

California.

From the mining summary of the *Scientific Press* of Jan. 10 we extract the following items:

ALPINE COUNTY.

Schenectady (Tarshish) M. and M.—The mill is rapidly approaching completion. It would have been ready to commence work on New Year's Day had it not been for the impossibility of obtaining a sufficient number of skilled mechanics. It is, however, expected it will be in running order early in February. The machinery consists of 20 stamps, 650 lbs. each, which will work at the rate of 90 blows per minute; 6 amalgamating pans of a capacity of from 2,000 to 3,000 lbs. to the charge. There are 3 settlers, 7 ft. in diameter, with clean-up pan, etc.—all driven by a 60 horse-power engine, with two fine boil-

ers capable of generating steam in considerable excess of the present anticipated requirements of the mill. The roasting furnace in connection with the mill is on the revolving principle. The mine is looking well; much first-class ore is coming out of the lower tunnel, assays of which run from $100 to $1,000 per ton. It is expected this tunnel, with the 150 ft. level, will furnish sufficient ore to keep the mill running at the rate of 20 tons per day, without touching the large body of reserves in the upper works for some time.

AMADOR COUNTY.

Amador *Ledger*, Jan. 13.

On Tuesday last, workmen in the third stope in the Kennedy, struck the richest rock ever yet discovered in the mine. The main ledge in this stope is 9 ft. in thickness, and the whole body of rock equal to the best average rock in the country. In addition to the main ledge, on the day above stated a stratum of rock about 13 inches thick was discovered on the foot wall of extraordinary richness—we were shown a piece of the rock from this stratum, weighing 3½ pounds, litterally filled with the precious metal, estimated at $40 in value. We were shown by P. REICHLING'S assayer a gold brick of the value of near $8,000, the result of 16 days run of the mill, on rock taken from the Kennedy mine.

CALAVERAS COUNTY—SANDY GULCH.

Calaveras *Chronicle* Jan. 15.

The mines, so far as the rich placers are concerned, around this camp are nearly worked out. But there have been several new quartz discoveries made of late. The latest discovery of a mineral character was made by C. BROWN, who accidentally found a lead that will prove to be a rich and valuable mine. It is in the "Devil's Half Acre," a short distance from the Old Store. As soon as the roads are again in passable condition, the necessary machinery for the development of the mine will be placed in position and set to work. The main shaft is down 25 ft., and the lead from 25 to 30 inches in width, showing free gold in almost all the rock taken out. The old Woodhouse mine is being worked with renewed energy. From 25 tons of rock taken from the mine and worked at the mill of the proprietor, $1,490 was obtained. The owners expect to take out 500 tons of first-class ore this winter. The rock being taken out is of excellent quality. The "Big Mine," just across the South Fork is getting along nicely. The shaft is down 200 ft. and ore of excellent quality is being taken out of the levels being run. The ledge is wide and well defined.

PITTSBURG MINE

The Pittsburg mine, has not been impeded in work in the least by water, during the late storms. The mill is kept in constant operation and the rock which is being taken out is first-rate.

BANNER MINE.

The mine is looking well and men are at work in the 400 ft. level.

PERRIN MINE.

The Perrin mine on Wolf creek, below Grass Valley is looking splendidly. They are taking out rock at the rate of 24 tons per day when the mill is kept at work. The rock is rich and the expense in working is light.

LOCATION.

FAYETTE, BATTIS & Co. have located six claims for mining purposes on the North Fork of the Diamond creek, below the F. MEISTER claims, in Washington township.

NORTH SAN JUAN.

Cor. same: The mines at this place, Manzanita Hill, Birchville, French Corral, Empire Flat, Kennebec Hill and Moore's Flat are all in successful operation, and reports say, all of the companies are doing well.

The American claims at Manzanita Hill, within a mile of this place, are, and have been for months past, paying immensely.

At Columbia Hill recently a company has been organized, to construct a tunnel from a point near the South Yuba river, about half a mile above Cooper's bridge, and extending from thence to the mining ground of the company about 2,000 ft. distant from the starting point. When completed, this tunnel will drain all the mines at and near Columbia Hill, Kennebec Hill and in those neighborhoods, for it is the intention of the company to commence the tunnel low enough to work that entire country.

HYDRAULIC.

Grass Valley *Republican*, Jan. 14.

The Baltic Gravel Mining Company, near Randolph Flat, are actively at work hydraulicing. They employ 7 men, and have an abundance of water.

QUARTZ.

The owners of the Wyoming ledge on Wood's ravine, 2 miles from Nevada, have 250 tons of quartz out ready or crushing. The rock it is said will average $25 a ton.

PLACER COUNTY—OPHIR.

Cor. Placer *Herald*, Jan. 13.

On the Greene mine, GREEN & Co., have erected a double engine, one for hoisting the dirt and ore from the shaft, and the other for pumping purposes. Some time ago the company let a contract to parties to sink the shaft 100 ft. deeper. The contractors are getting along very well, and will complete their contract by early spring. The ledge in the shaft is of good size, looks well and will pay rich.

We will follow along the Green ledge and the next mine in operation is the original Peter Walter mine. This company have erected steam works on their mine and have a 25 horse-power engine. The levels that are being run are at the depth of 116 ft. from the surface, and they find no variation in the quality or quantity of the rock, it continuing to look well, the quartz showing free gold and plenty of rich sulphurets. The ledge is a good size, and in a short time the mine will be opened thoroughly. The company contemplate erecting a 10-stamp mill as soon as the weather will permit.

North of the Peter Walter some 300 yards is the Bellevue, originally the Buckeye. This company have at their dump pile near 500 tons of ore that is No. 1. I have no doubt but what they will realize from this rock $15,000 in free gold, and probably $5,000 more in sulphurets. They intend to crush this ore at the St. Patrick mill, and will begin about the 20th of this month. The Bellevue company are still raising rock to the surface.

The St. Patrick mill contains 15 stamps, and with all the improvements sufficient to save the gold and adequate pans to work the blanket washings and sulphurets. This mill is run by steam, and in connection with it the company have a ledge called the Perchy that they are prospecting with a tunnel and shaft. The tunnel will cut the ledge about 130 ft. from the surface. The shaft is down to the depth of 75 ft., and they are running a level at this depth and finding a good sized ledge and good ore. The St. Patrick mine is still in operation; they are running a bottom level with a good prospect. They are crushing ore from this mine at their mill, and judging from appearances, it is paying very rich. They have a large pile of ore at this mine which they will finish crushing as soon as they get through with the Bellevue rock.

AMADOR, IDAHO AND EUREKA MINES.

We take the subjoined from the San Francisco *Alta* of 21st instant:

The annual report of the Amador mine, which was so long out of work on account of fire, and then delayed several months for want of water, and harassed by strikers, shows a production of 17,790 tons of ore, of which 16,490 tons were crushed in a 40-stamp mill, giving $12.21 average or $201,357 of which $24,000 was paid to stockholders. This was about 4 months work only, and shows how much may be got of $12 ore. That of the Eureka, Grass Valley, is of much better grade. The Idaho mine, which adjoins the Eureka, Grass Valley, and holds about the same relation to it that Belcher does to Crown Point, having the same body of ore, divided by the boundary line, took out and crushed 11,133 tons of ore last year, giving $385,017, or $35 50 per ton, from a 15-stamp mill. The average cost of milling and mining was $10 25 per ton, showing a profit of $ 25 25 per ton, and the stockholders received $75 per share or $232,500, or about $21 for each ton crushed, including the sulphurets. This great result is produced by economical management, without stock-jobbing. The whole expense of salaries per month is $250, or half what is paid the Superintendent alone in other mines. The Eureka, which adjoins it, has never been assessed, but paid during 5 years and 2 months 62 dividends, amounting to $1,731,000, or $86 70 per share. An interruption to the product then took place, which has affected the stock. Another dividend has recently been paid of $20,000, and $39,000 carried over, while the Company is entirely out of debt. The stock rose from $220 June, 1870, to $380 December, 1870. It then fell to $60 June, 1871, when the dividends stopped. It has since fallen to $18, with a large surplus and mine looking well. The rise in 1870 was as singular as the subsequent fall.

Nevada.

WHITE PINE DISTRICT.

From the White Pine *News*:

THE EBERHARDT AND AURORA CO.'S WORKS.

A few days ago we visited these mines and works. In the Ward Beecher we first decended to the bottom of the open cut, a distance of 45 feet, where the ledge pitches east at an angle of 32 deg. Connecting with it is the Phillpots chamber, through which the ledge can be easily traced for a distance of 85 feet. In the east end of the chamber a large body of fair milling ore is in sight. We found a force of men at work making an opening preparatory to breasting out. In the bottom of the chamber there are about 300 tons of ore broken down. Retracing our steps from the chamber to the open cut, we entered another large chamber, running north and opened out for a distance of 240 feet, which brought us to the line of ground in dispute between the English Company and the Beecher Company. It is estimated that there are 5,000 tons of ore in sight above the floor of the chamber. The depth of the ore in the bottom has not been determined. There is a fine showing of it in sight, and as in other parts of the mine, it dips to the east. From the south side of the open cut, a drift is pushed ahead south to connect with the Lady's chamber, and connection will be made with that portion of the mine in a few days. Visited the east and west drifts, running to tap the ore in the Phillpott's chamber, and found fair ore in sight. The next place examined was the raise (and drift) to tap the open cut in the south end of the Ward Beecher at the mouth of the Phillpott's chamber. Then, into a drift running south from the top of the Lady's chamber, for the purpose of opening out into the south drift. The south drift is in a distance of 130 feet from the chamber. For most of this distance it cuts through a mass of low-grade ore. The recent strike was made at the end of the drift, and shows rich ore. The ore in the bottom looks fully as well as any other part of the chamber. Also, a fine showing in the east and south facings. The distance from Risdale chamber to the south line of the ground owned by the Eberhardt and Aurora Company is 220 feet, and the length of the ground from the north to south line is about 1,400 feet. There are over 500 feet north of the Risdale chamber untouched, and it is reasonable to suppose that the same streak of ore found in North Aurora runs through to the Risdale.

GREAT VALLEY MINING COMPANY.

The mines owned by the Great Valley Mining Company are at the foot of Babylon Hill, near Shermantown, and consist of Great Valley and Union mines, with a length of 2,000 feet of ground. The location of the ground was made in April, 1868. A tunnel was started, and run west a distance of 200 feet in ore. Fifty feet from the end of the tunnel a shaft was put down and ore found. An air shaft was sunk 125 feet deep, and they found a fine body of ore the whole distance down. Afterward a shaft 30 feet deep was sunk on the side, and a ledge of mineral five feet wide developed—making altogether 155 feet in ore, from the top of the air shaft to the bottom of the 30-ft. saft. Three other shafts are down on the line of the ledge, and ore found in all of them. The ledge is prospected for a distance of 1,000 feet, showing ore wherever the ledge is opened. Five hundred tons of ore were extracted from the mine; 100 tons were disposed of at the Matteson Furnace, and 400 to the other furnaces in the district. It is estimated that 75 tons of ore can be extracted daily from the present openings, and the number of tons increased after further openings are made.

ORIGINAL HIDDEN TREASURE.

Work was suspended for a few days. Teams will be put on to ease the dumps during the coming week, if the condition of the roads will permit; and as soon as the dumps are cleared of rock the usual force of men will go on in the mine.

SILVER WAVE.

The Perkins shaft is down 60 feet. A new contract was let on the 25th ult. to sink 75 feet deeper. The Lyford shaft is down 60 feet, and the incline is down to 25 feet. Now running east from the bottom. The formation in sight in the Chenoweth is black spar. Running cross-drift. Drift also running east from No. 4 shaft, with good indications ahead.

EAST SHEBOYGAN.

Connections have all been made, and the manager will soon have the Exchange shaft and the original tunnel, also the Exchange incline and Regent shaft connected. The manager claims that there is sufficient ore in sight to supply a 10-stamp mill for three years.

SECOND SOUTH EX. OF HIDDEN TREASURE.

The drift running north from the foot of the north incline is carried along upon the stratified spar wall, which dips easterly under the Edgar shaft, and carries the great ore gouge. At the depth of 60 feet in the North shaft, on Nevada street, a drift has been started running in an easterly direction. Working ten men and prosecuting work day and night.

SOUTH AURORA.

Work is pushed on in the tunnel without intermission.

All the works show favorable indications of finding ore when the point aimed at is reached.

EDGAR.

There are 150 tons of ore on the dumps, which will be shipped to mill when the roads are in good condition. A force of ten men are at work in the breast. The body in sight is about 50 feet wide and increasing in width.

ICEBERG.

The heavy fall of snow on Treasure hill set back work. The breasts show well as far as the mine is opened.

Colorado.

NEW SILVER MINES IN COLORADO.

Interesting discoveries of argentiferous lead ores were made last Summer on Mount "Lincoln" and Mount "Bross," near the town of Montgomery, Summit county, Colorado.

These mountain peaks are supposed by many, to be the highest in Colorado.

Near these summits, and more than 2000 feet above the timber line, there is a stratum of limestone, about 200 feet in thickness. The mineral deposits are in this limestone foundation. The ores, found in *pockets*, are similar in nature and appearance to those of the famous "Emma" mine in Utah. From one shaft 10 feet in depth ten tons of ore was taken, which without selecting, yielded 450 dollars per ton. These mines were discovered so late in the season that there was but little time for development.

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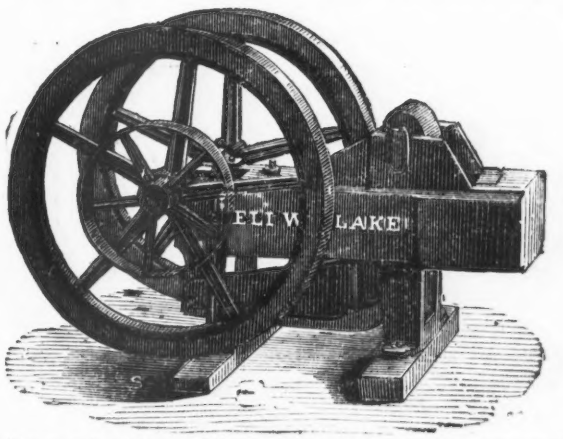

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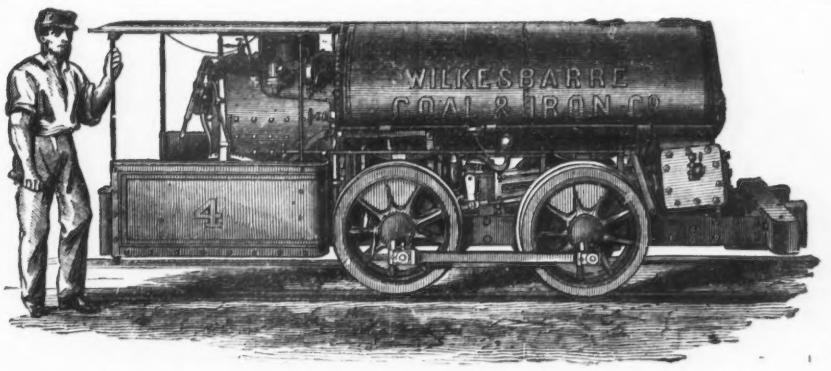

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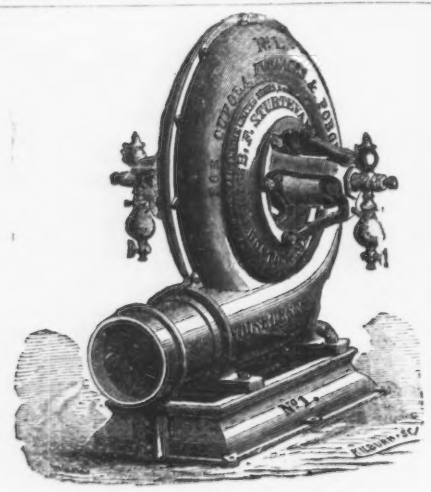

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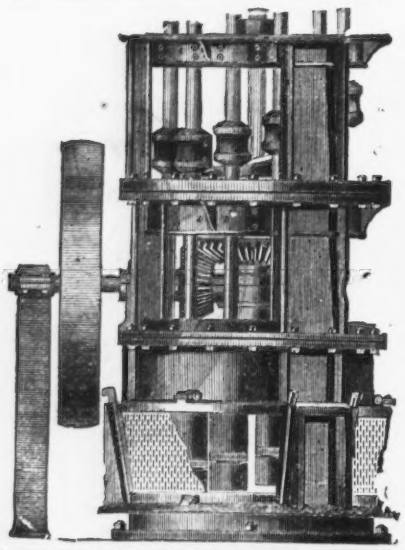

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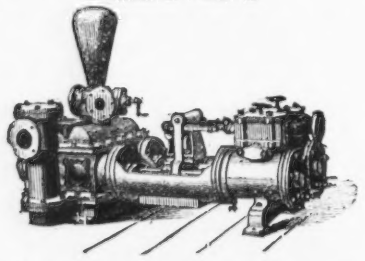

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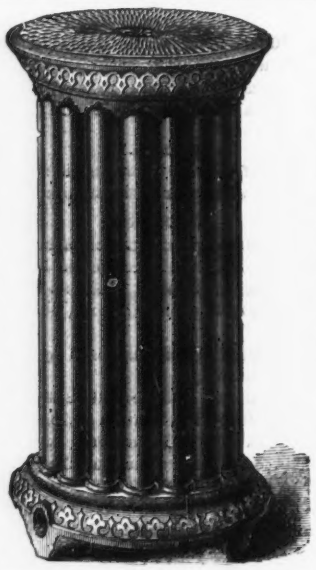

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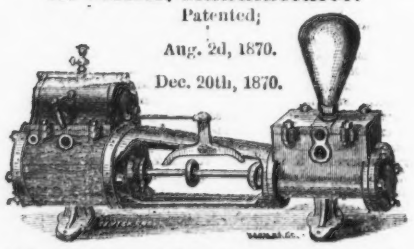

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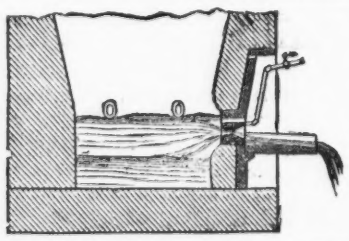

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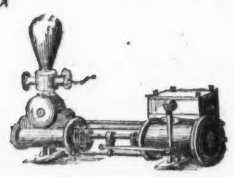

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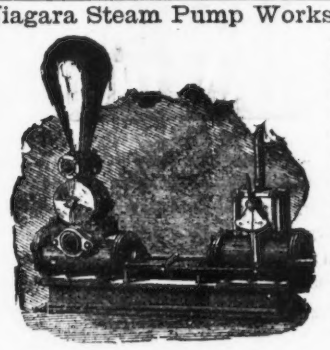

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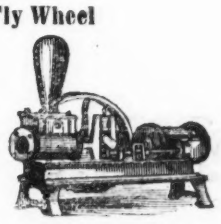

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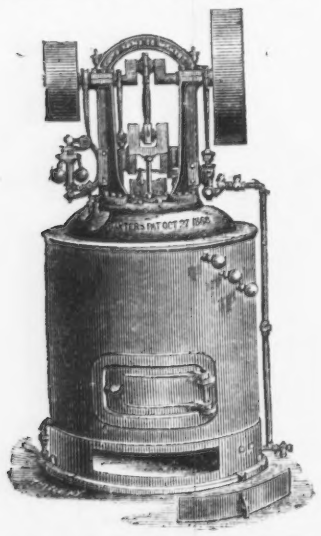

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